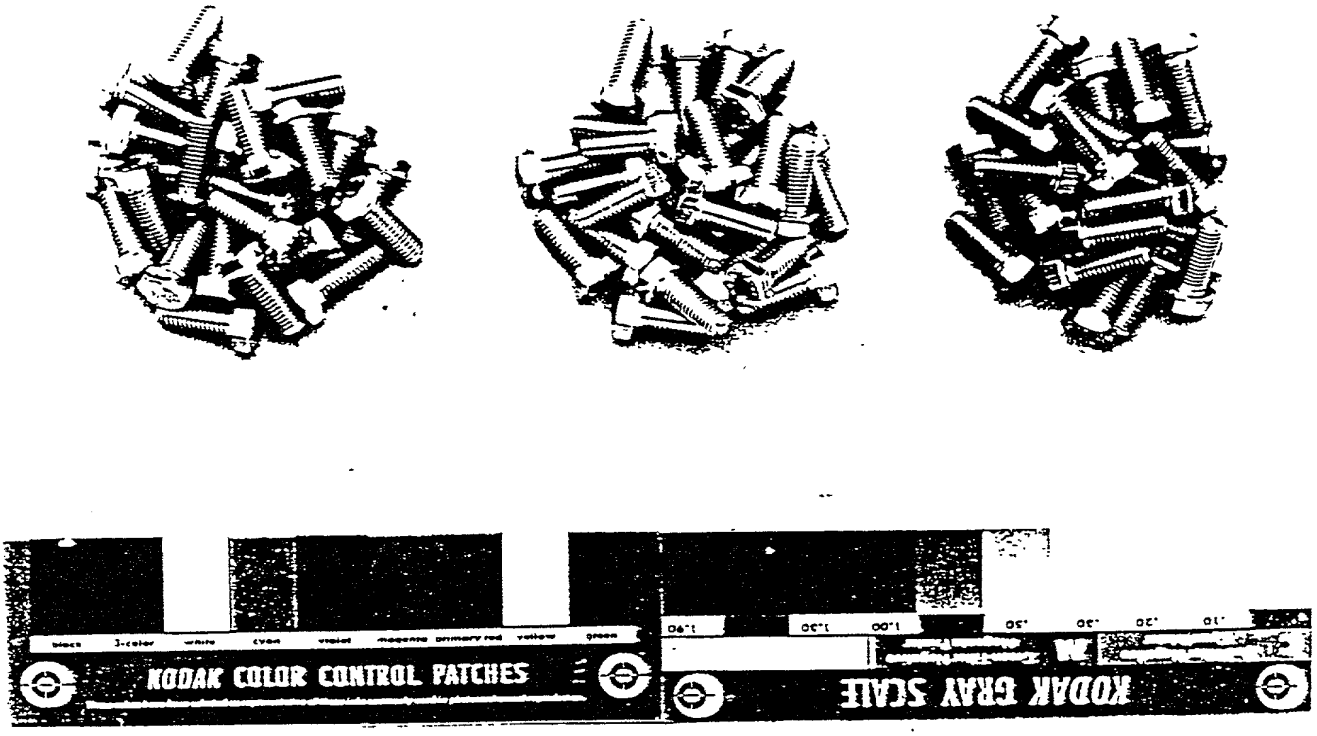
Fig. 1

Color comparison of various passive layers



Substrate: Zinc-plated screws

Blue chromation:	Left picture half
Invention:	Center
Yellow chromation:	Right picture half

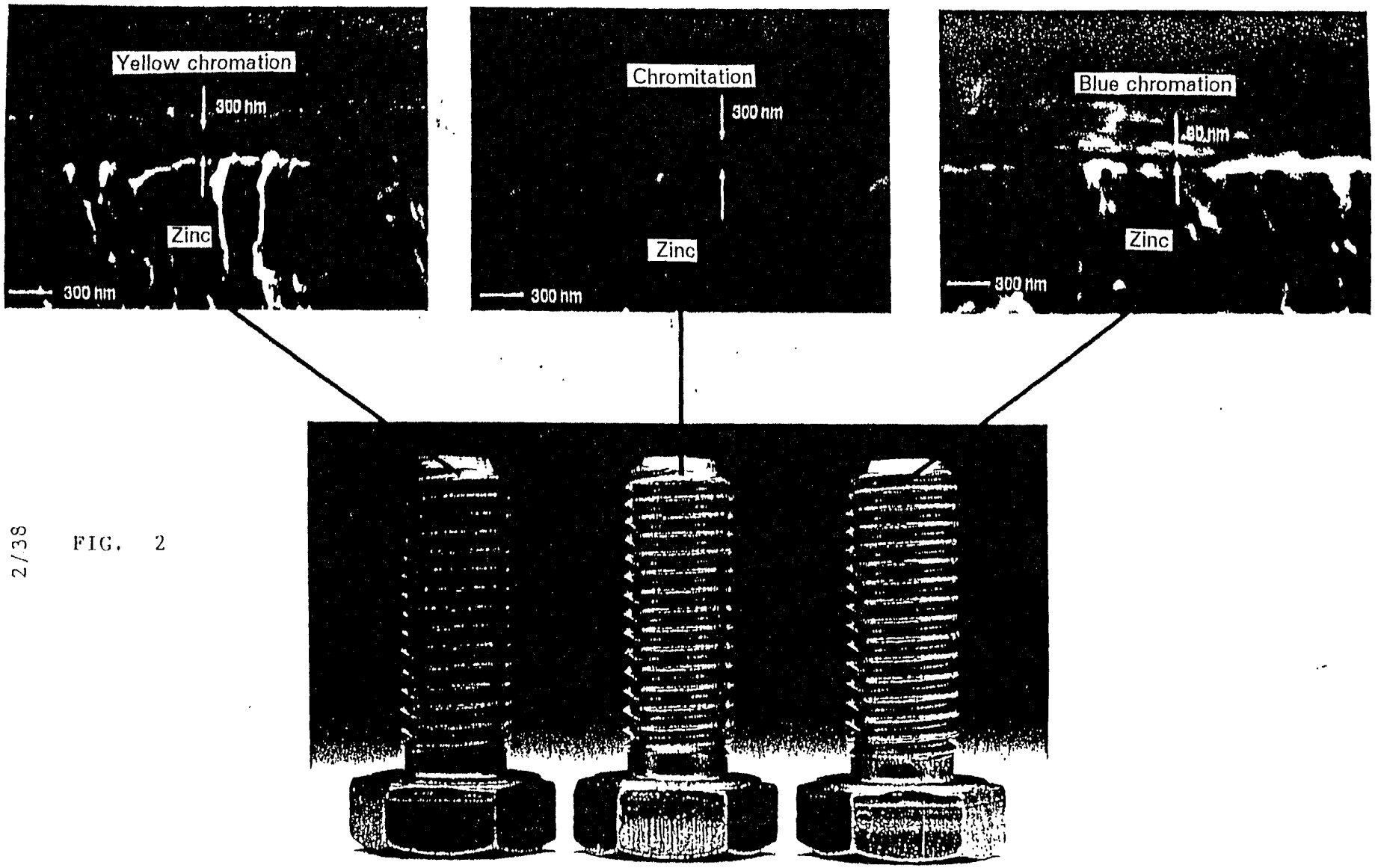


FIG. 2

Fig. 3

Bandwidth of iridescence according to the present invention
(on zinc-plated screws)

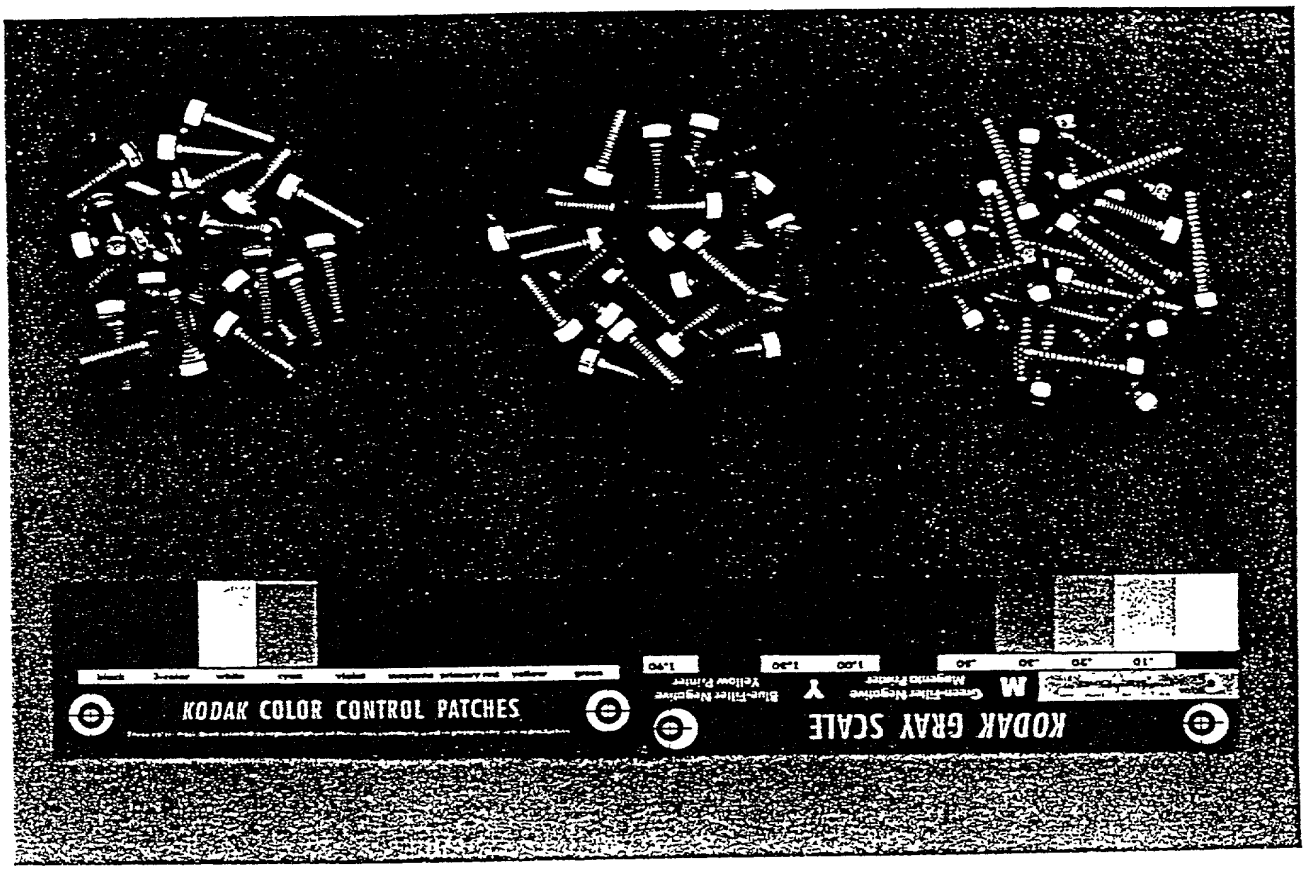
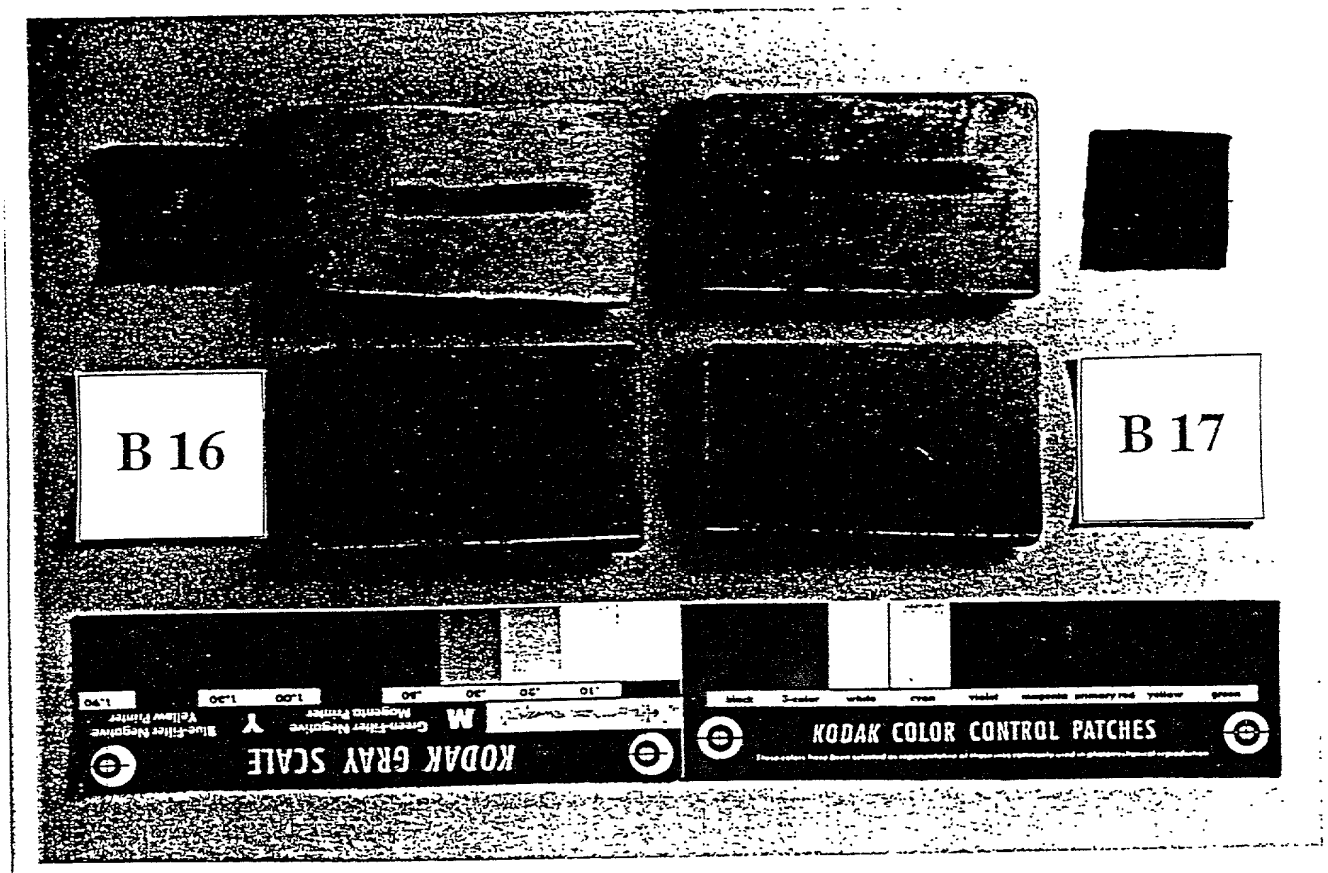


Fig. 4

Comparison test with EP 0 034 040

Example 16 Example 17



The upper picture half, one the outer left and right, shows a black cloth whereby the abrasions on the metal sheets shown in the top picture half were obtained. Layer portions - discernible as whitish stains - are on both pieces of cloth. The lower picture half shows the unmarred layers of the prior art.

Substrate: Zinc-plated steel sheet.

Diagram 1

FIG. 5

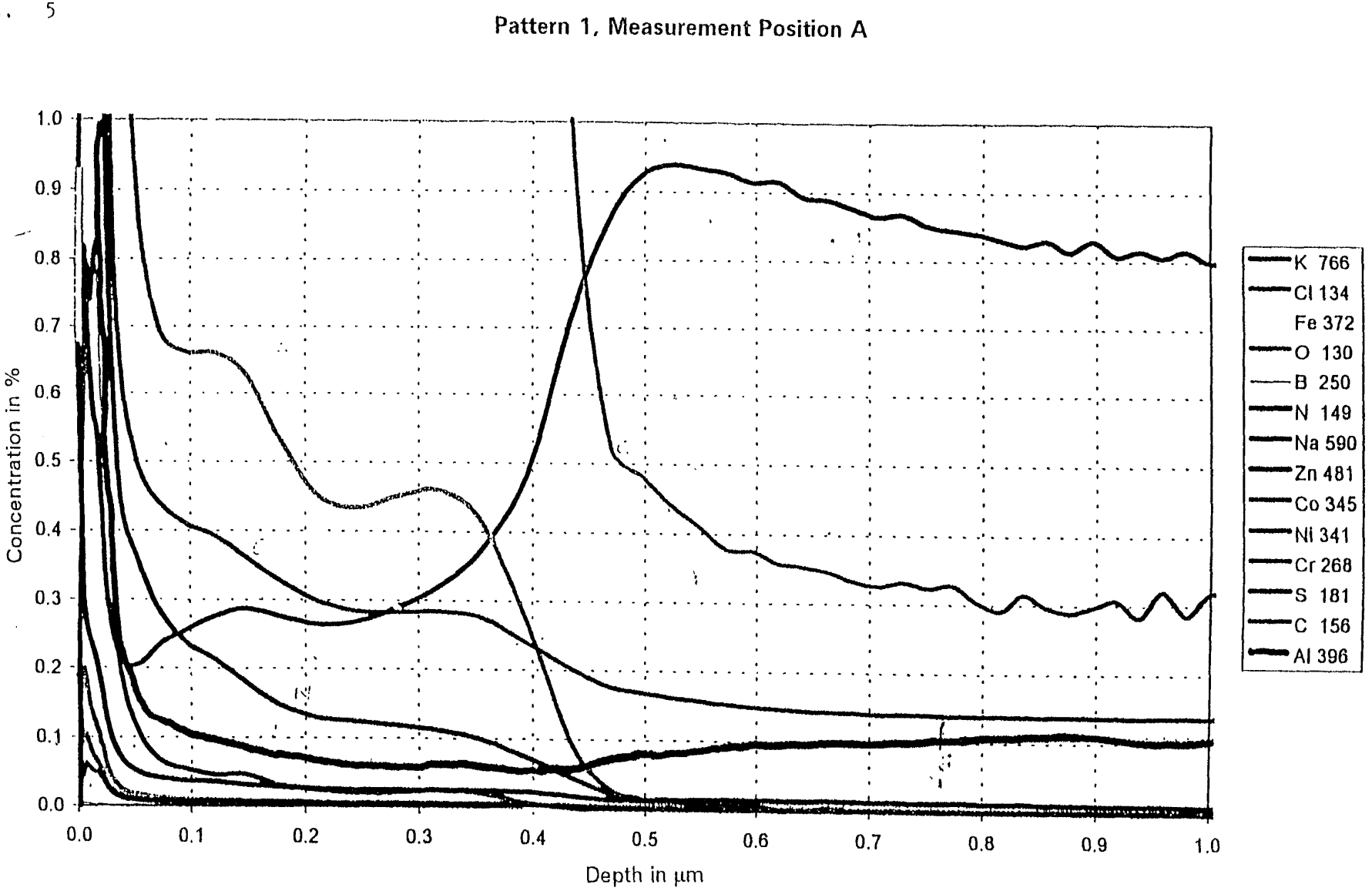


FIG. 6

Pattern 1, Measurement Position A

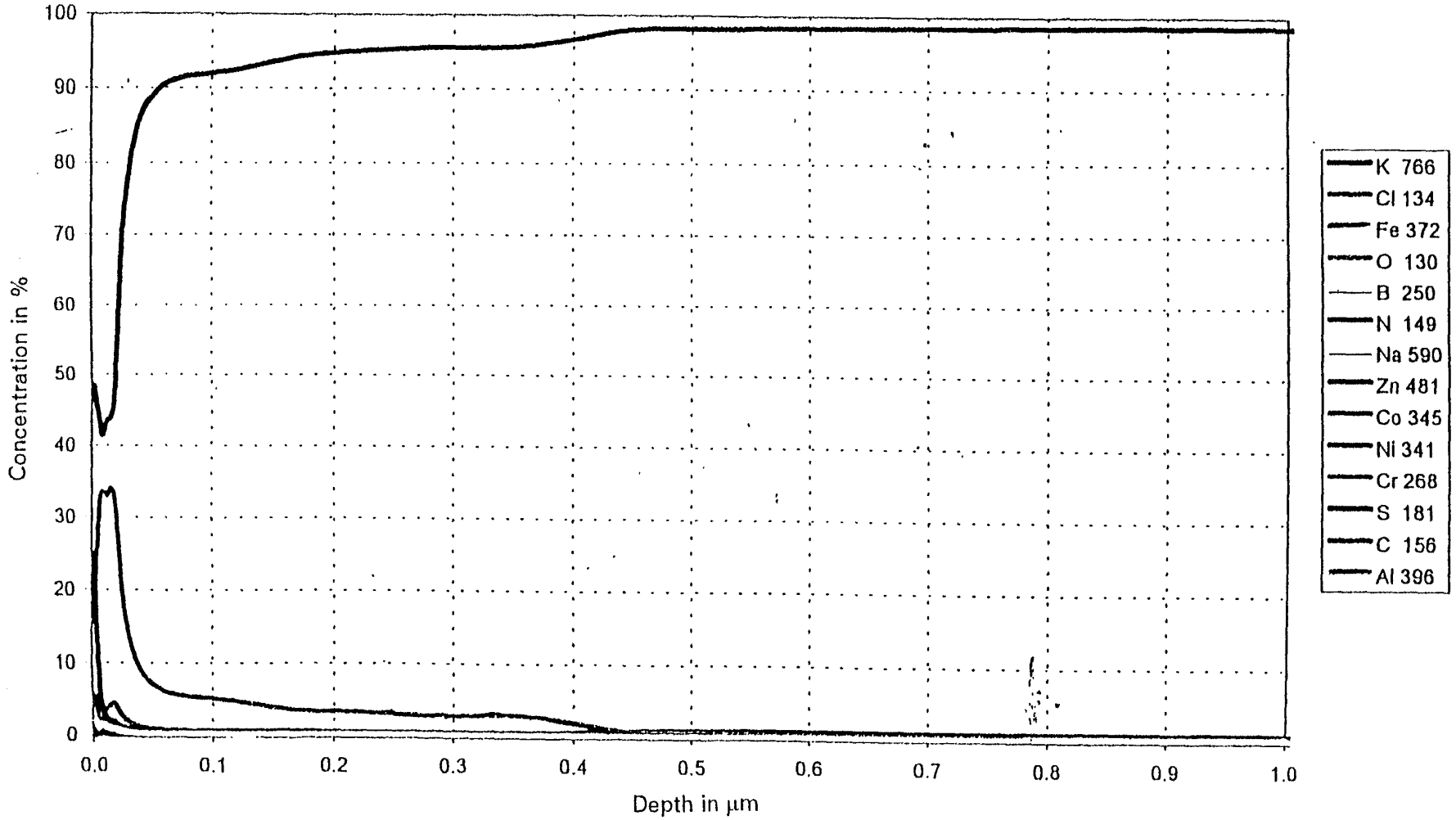


FIG. 7

Diagram 1

Sample 1, Measurement Position B

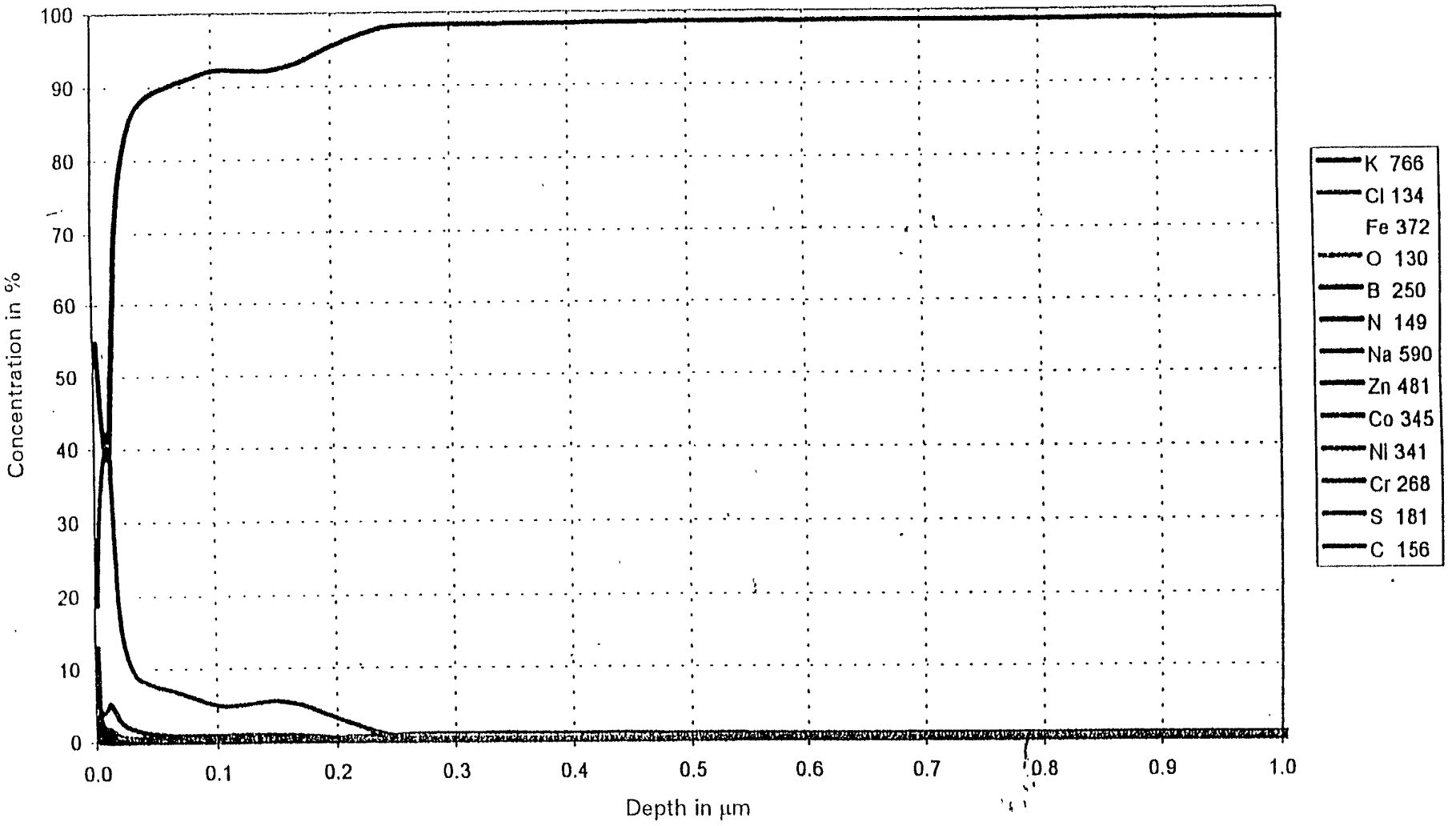


FIG. 8

Diagram 2

Sample 1, Measurement Position B

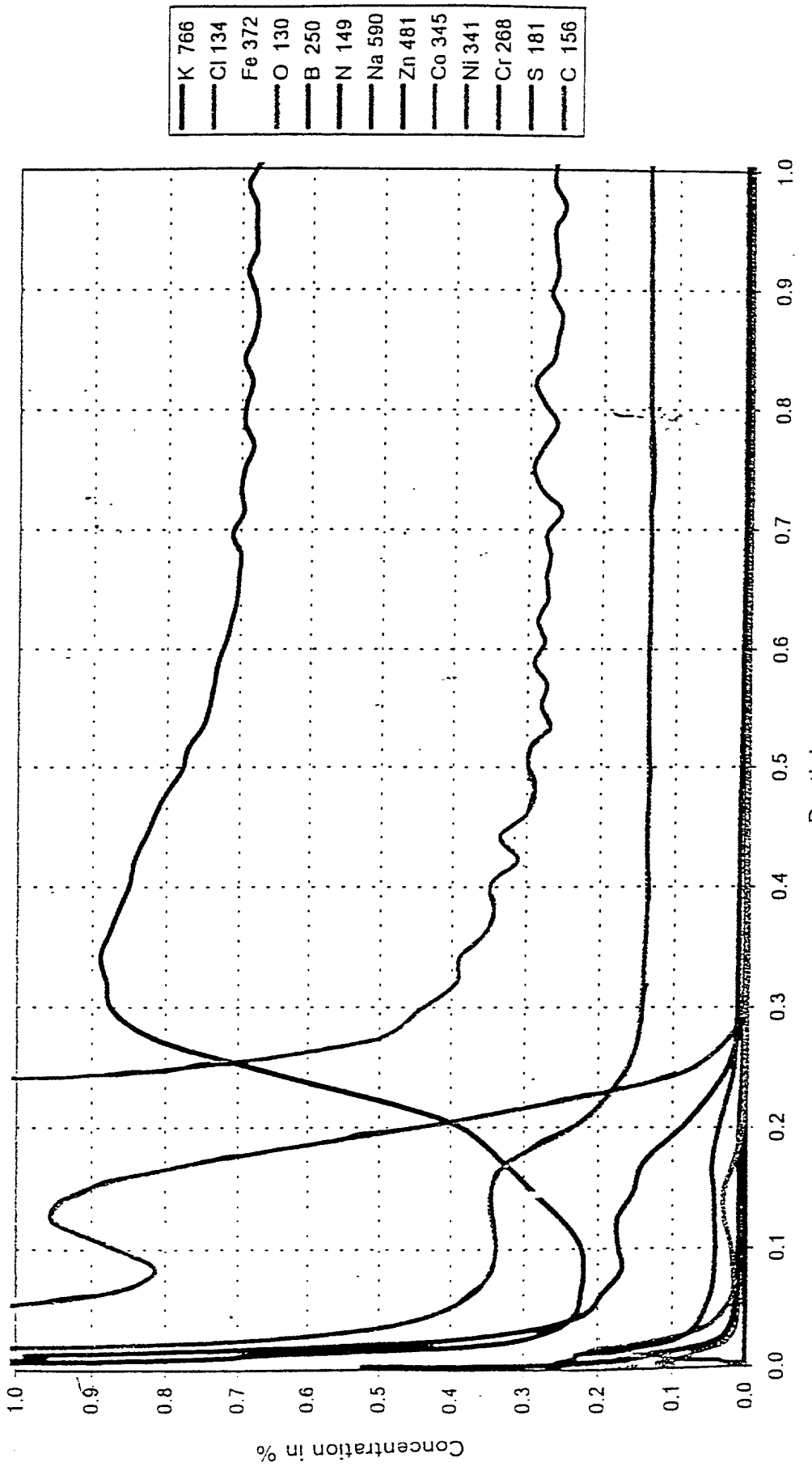


Diagram 1

FIG. 9

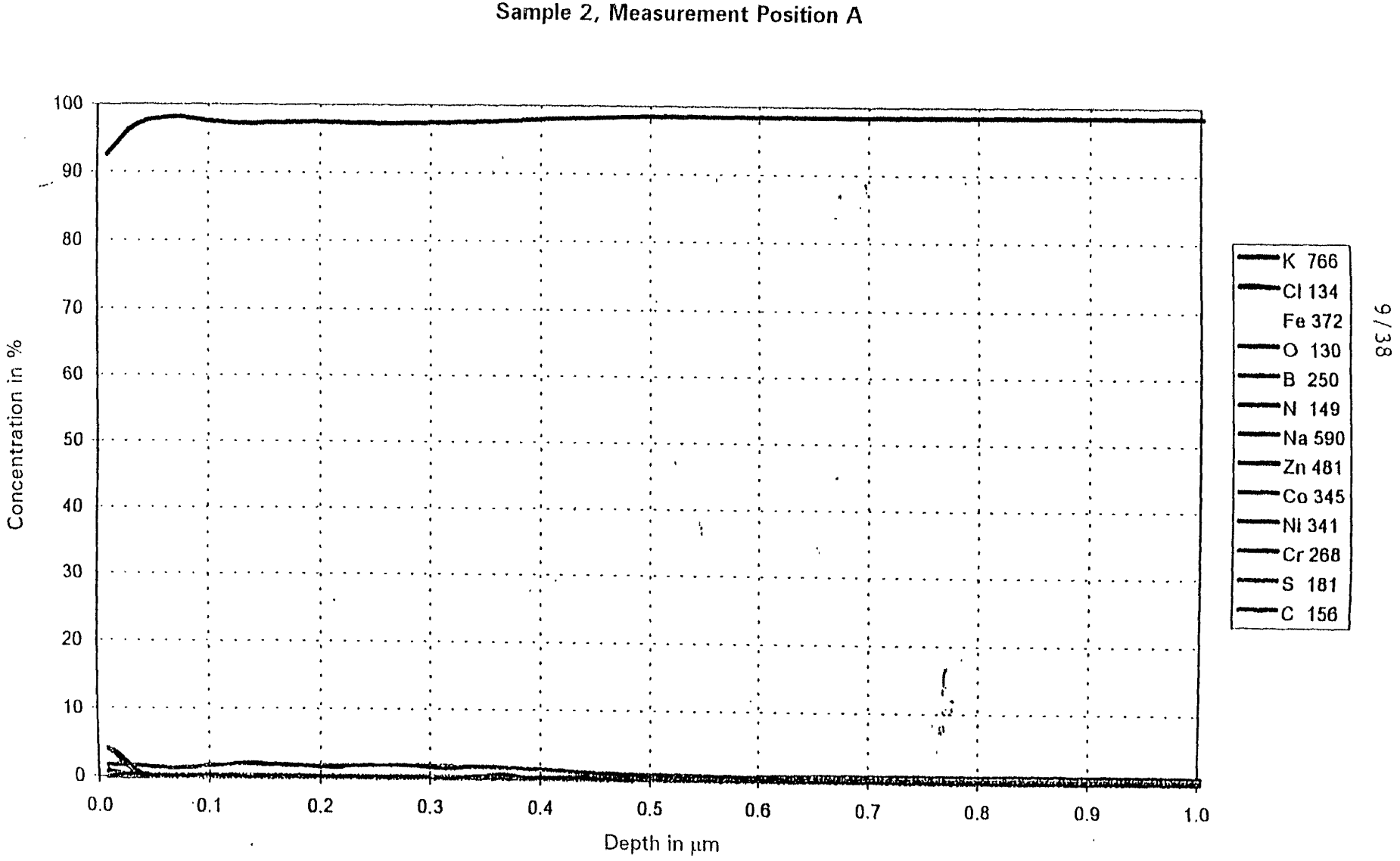


FIG. 10

Diagram 2

Sample 2, Measurement Position A

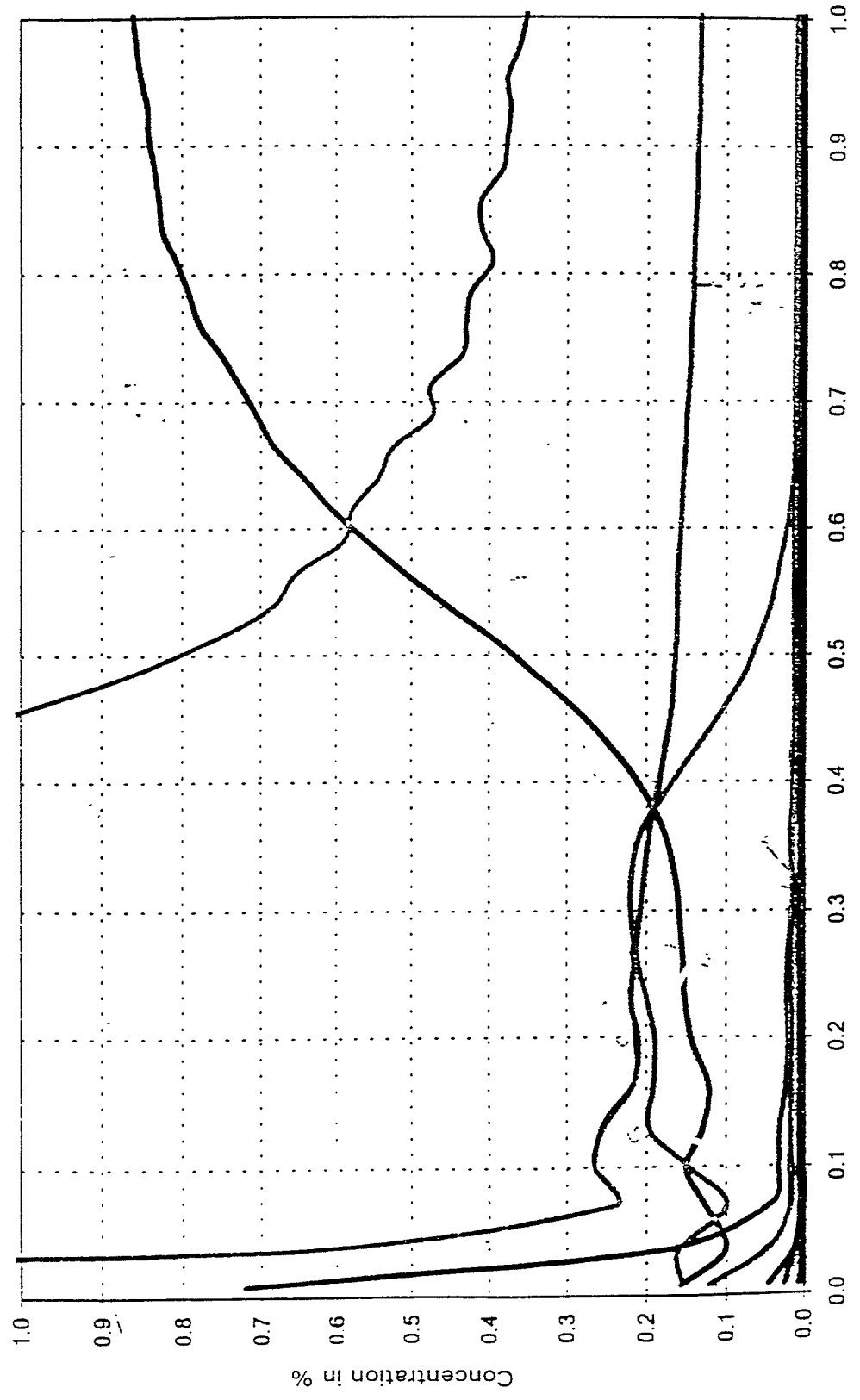


FIG. 11

Diagram 1

Sample 2, Measurement Position B

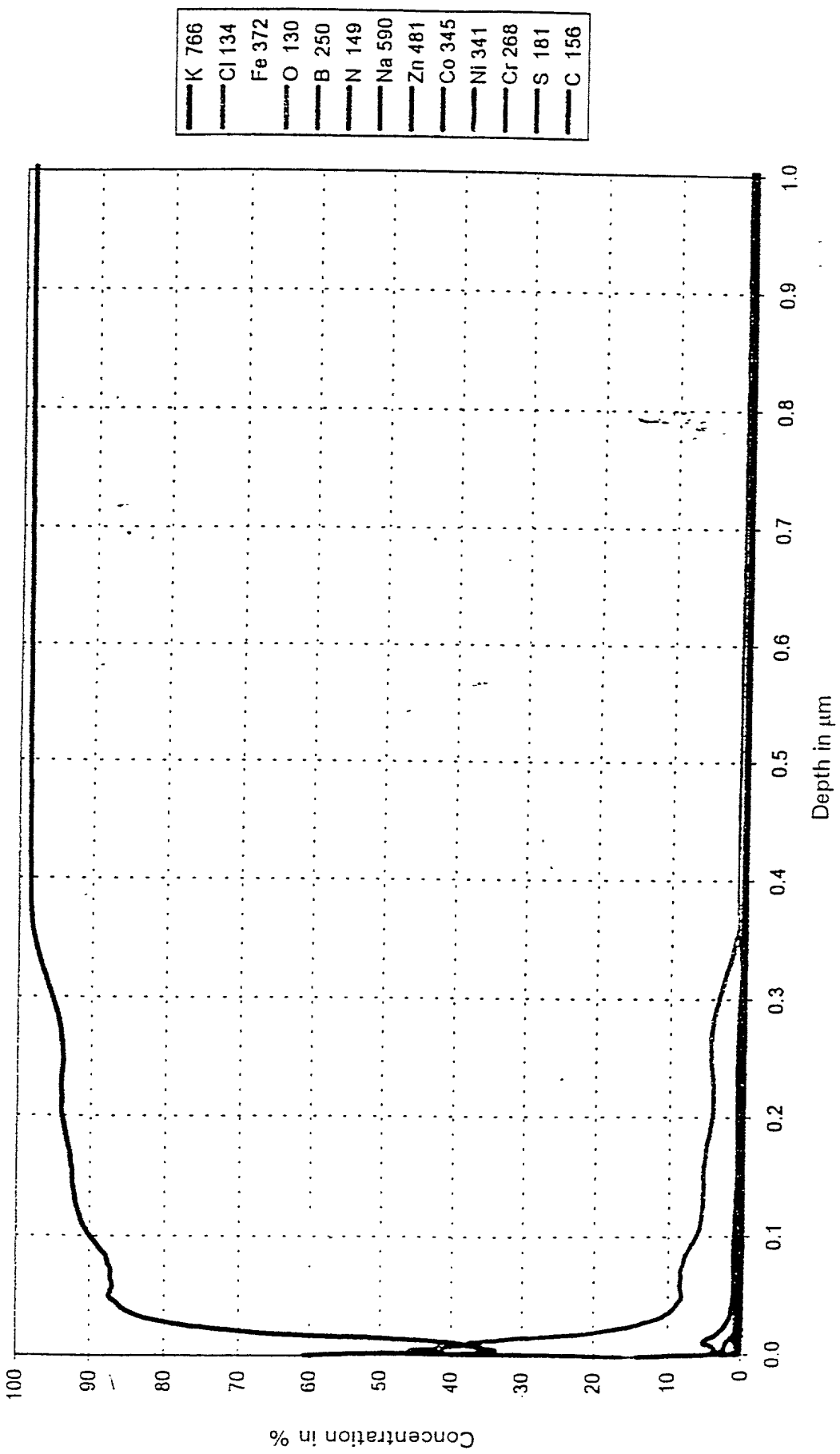


FIG. 12

Diagram 2

Sample 2, Measurement Position B

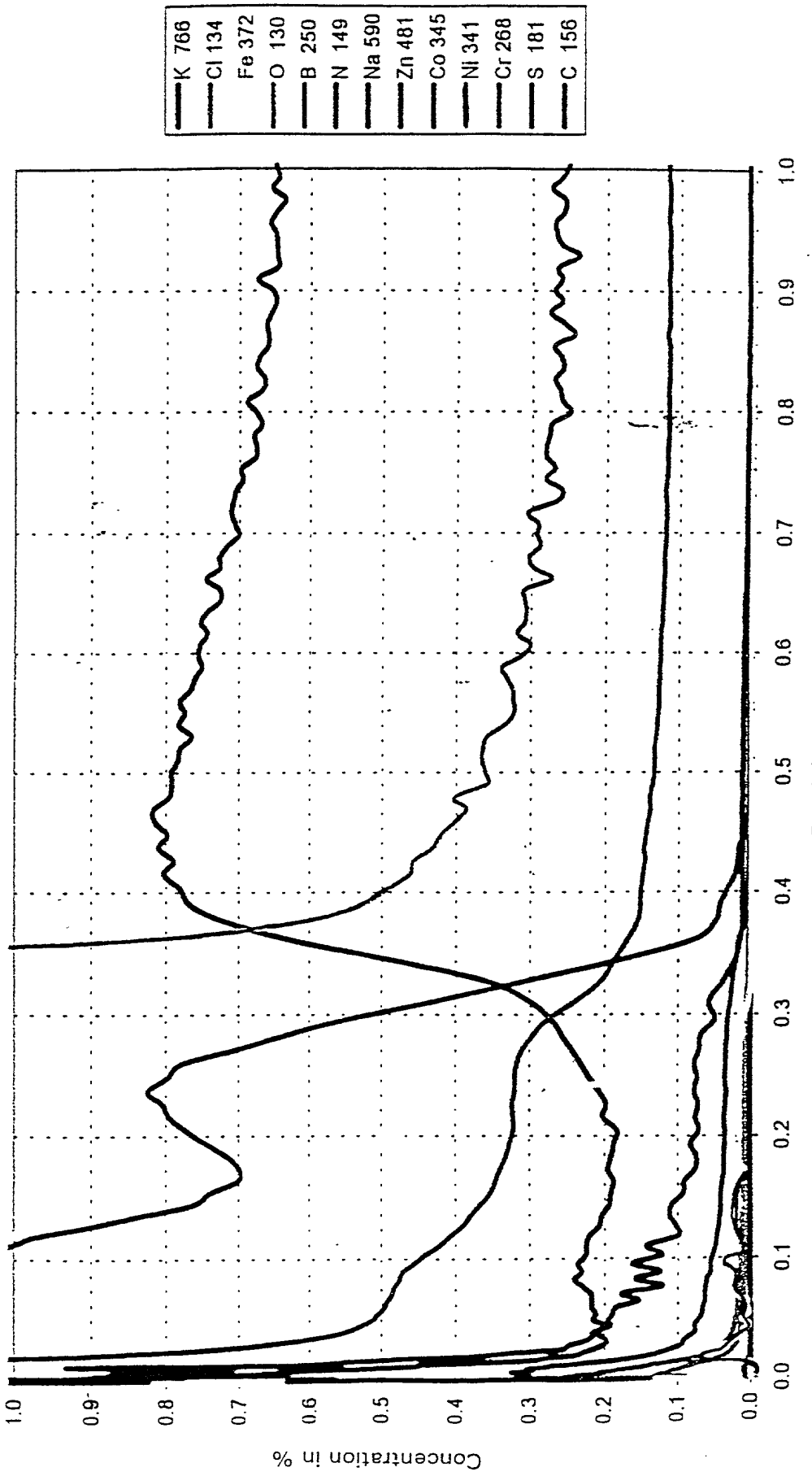


Diagram 1

FIG. 13

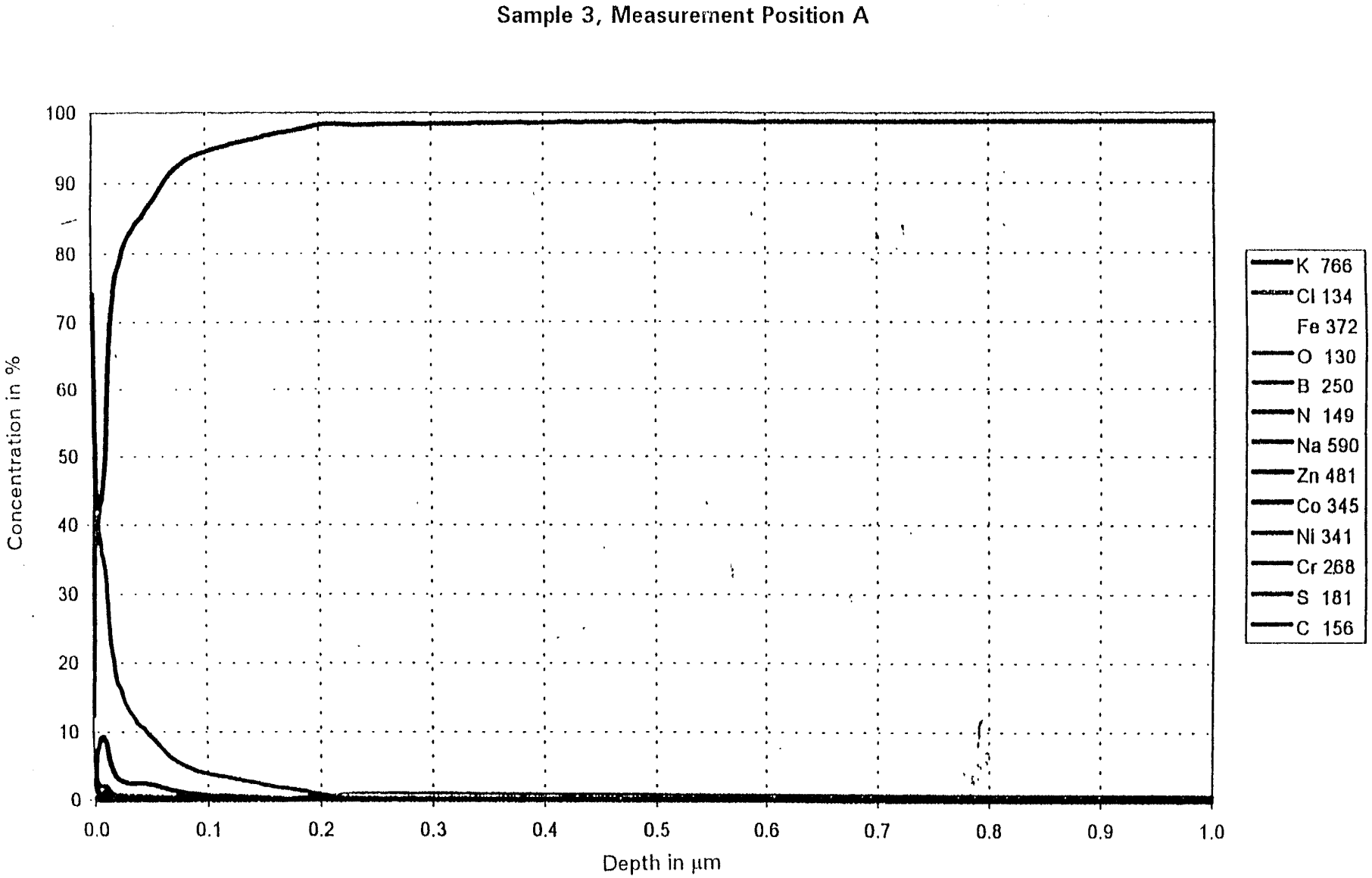


FIG. 14

Diagram 2

Sample 3, Measurement Position A

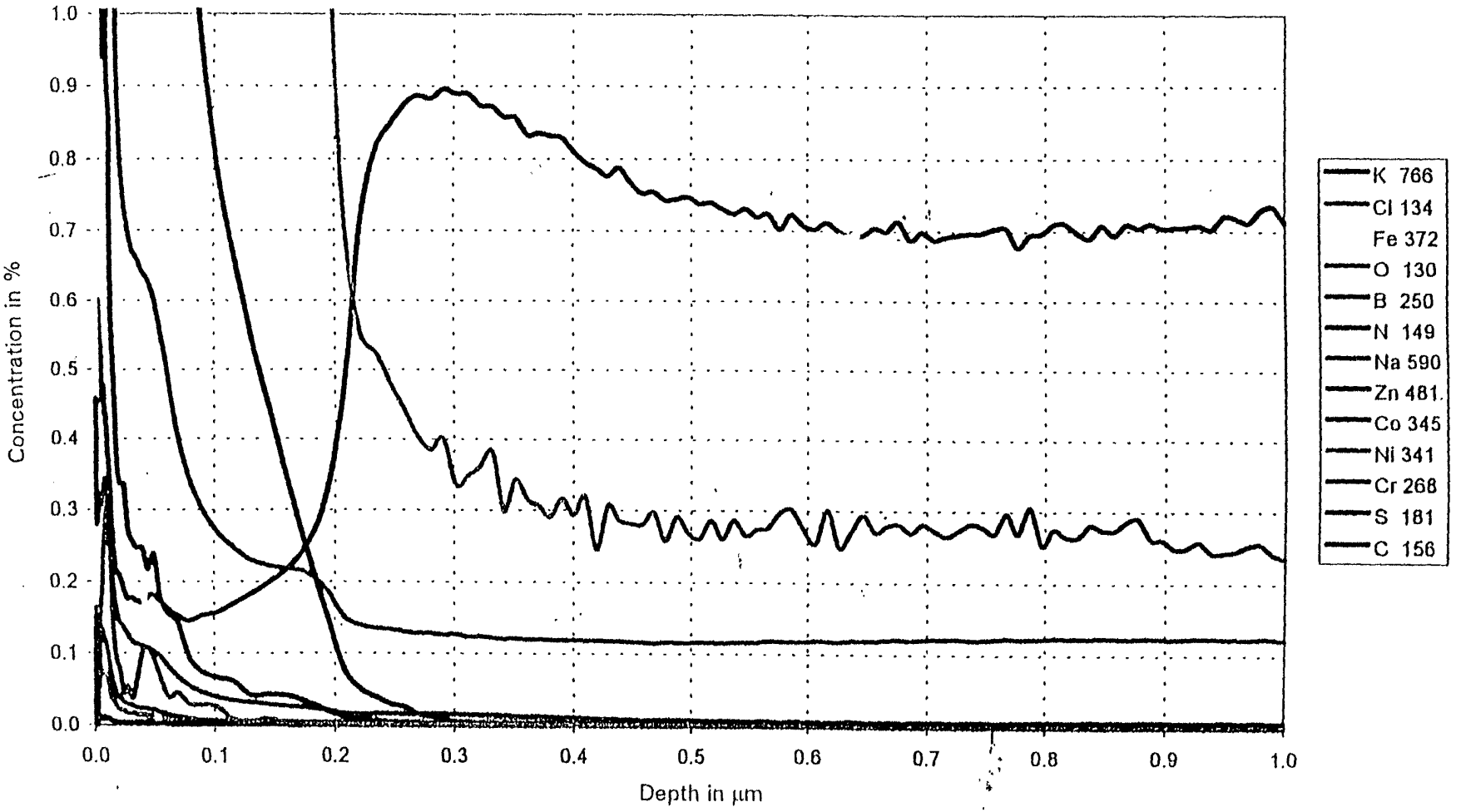


FIG. 15

Diagram 1

Sample 4, Measurement Position A

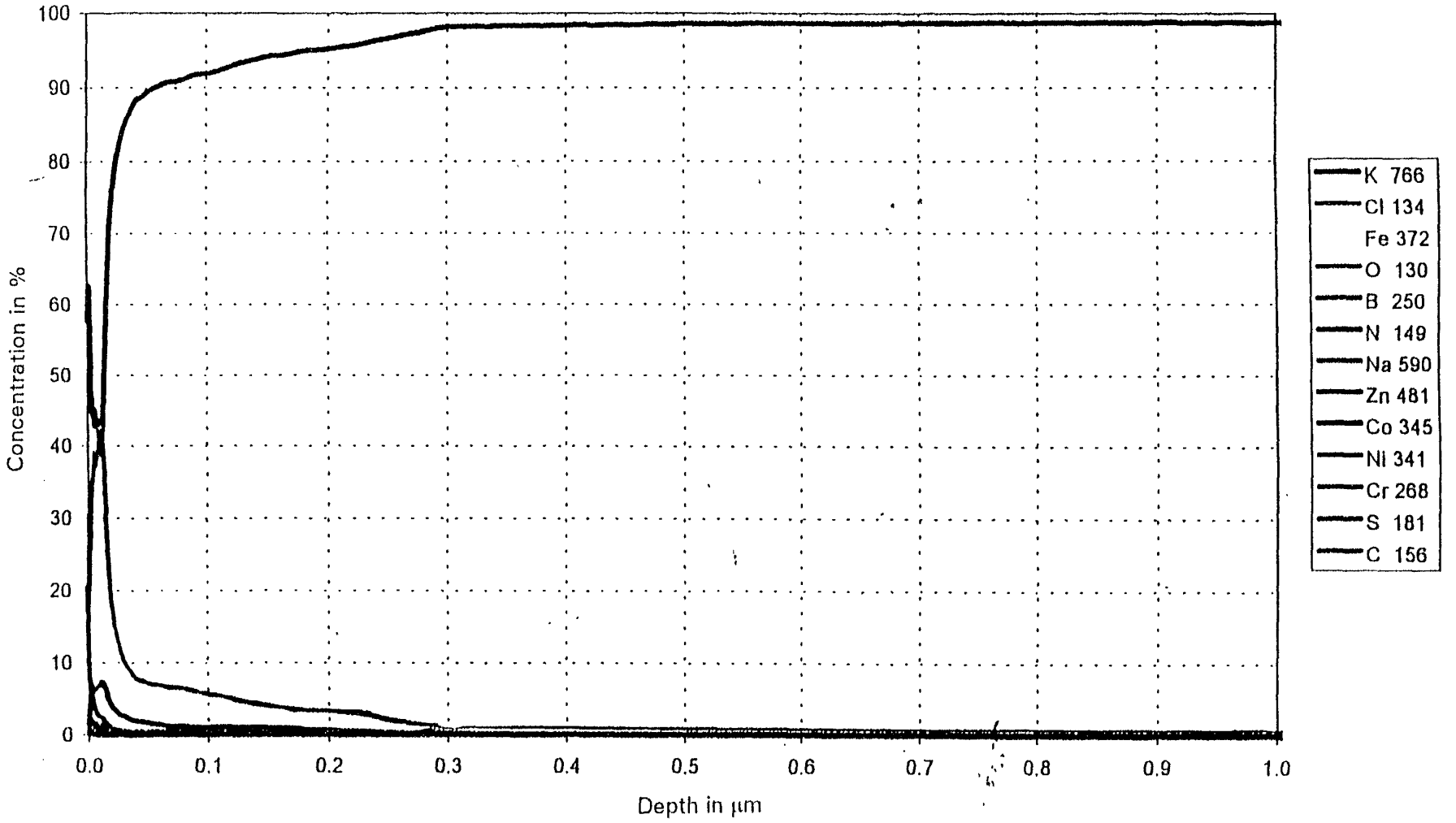


FIG. 16

Diagram 2

Sample 4, Measurement Position A

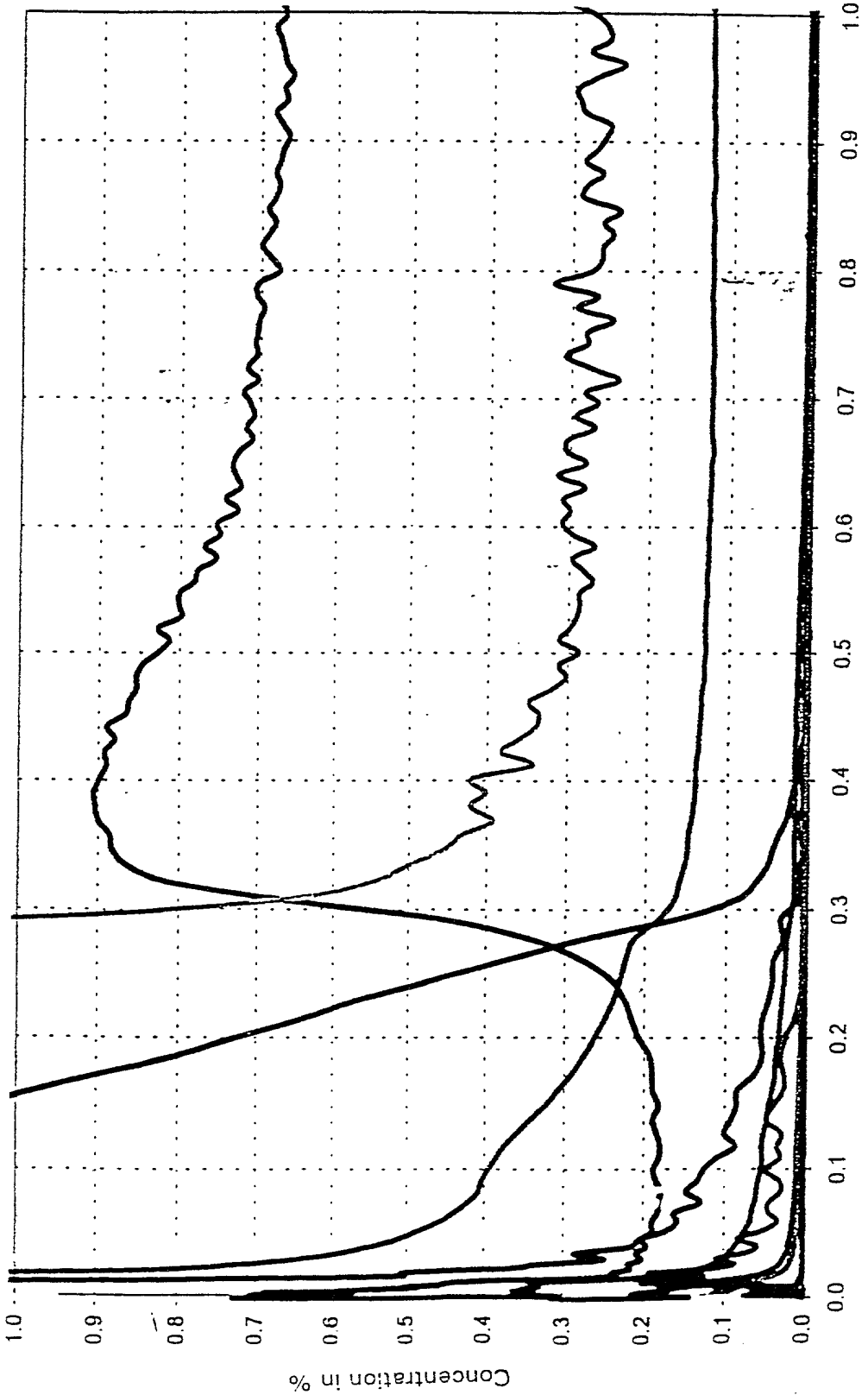


FIG. 17

Diagram 1

Sample 5, Measurement Position A

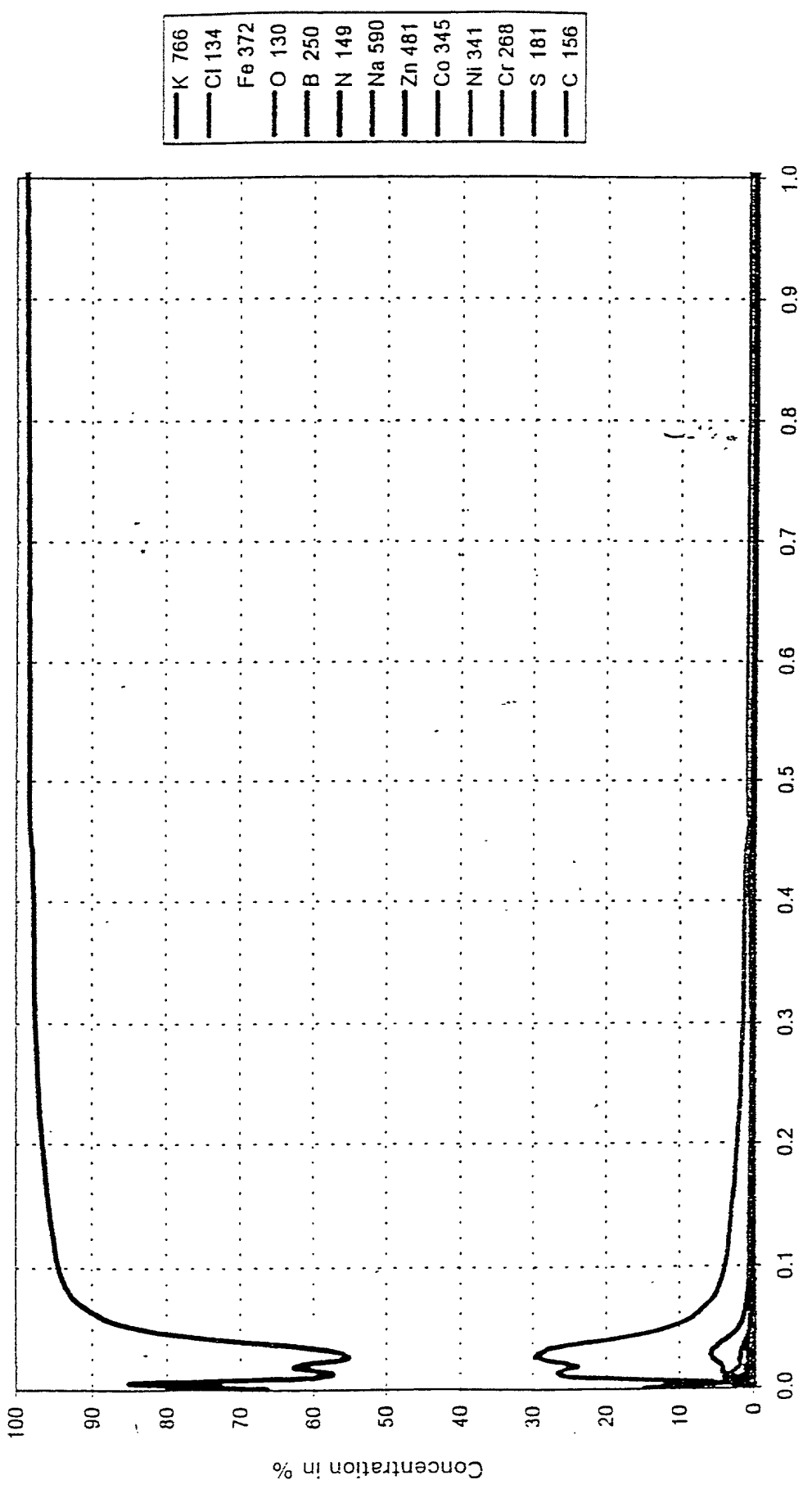


Diagram 2

FIG. 18

Sample 5, Measurement Position A

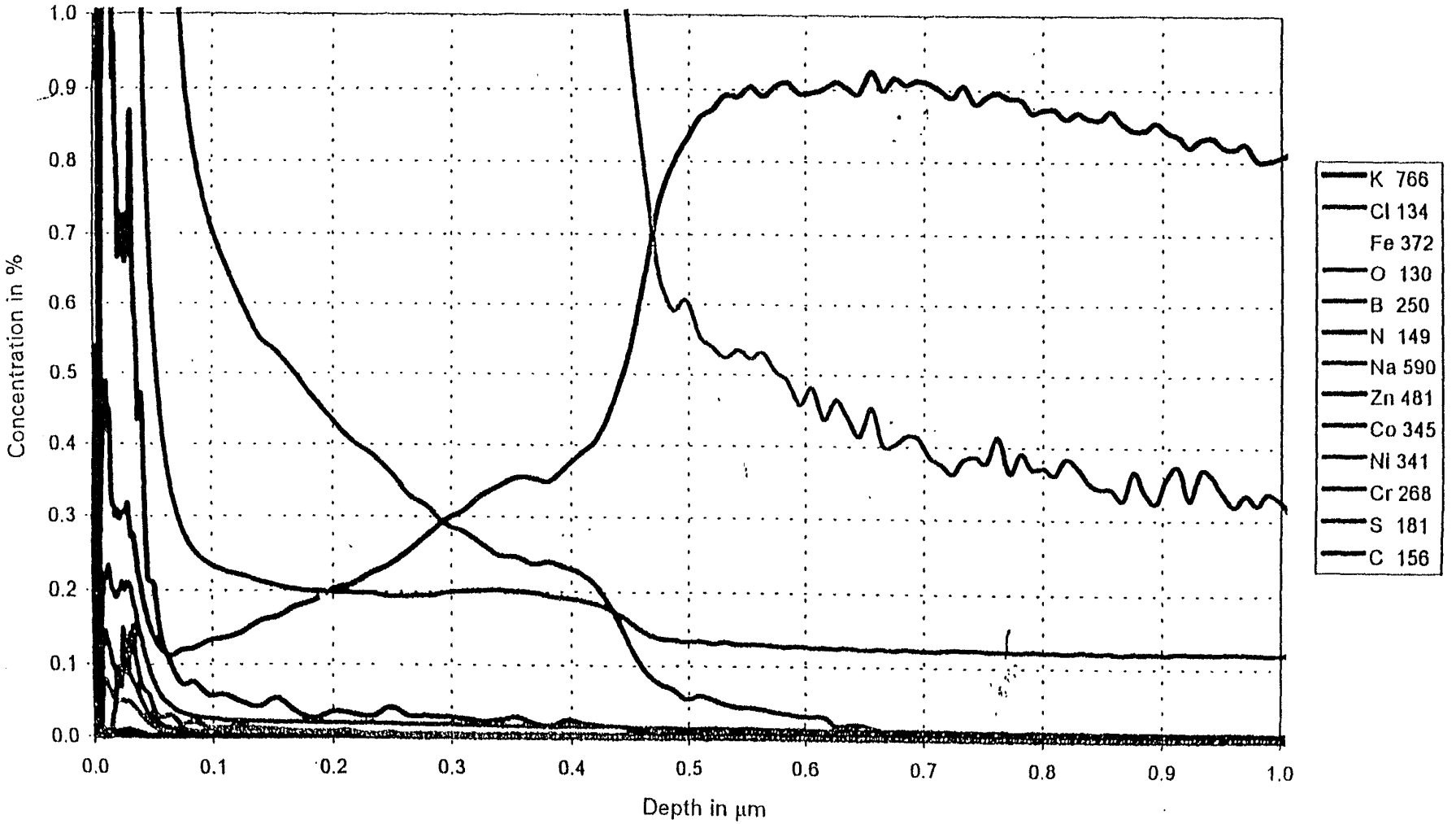


FIG. 19

Diagram 1

Sample 6, Measurement Position A

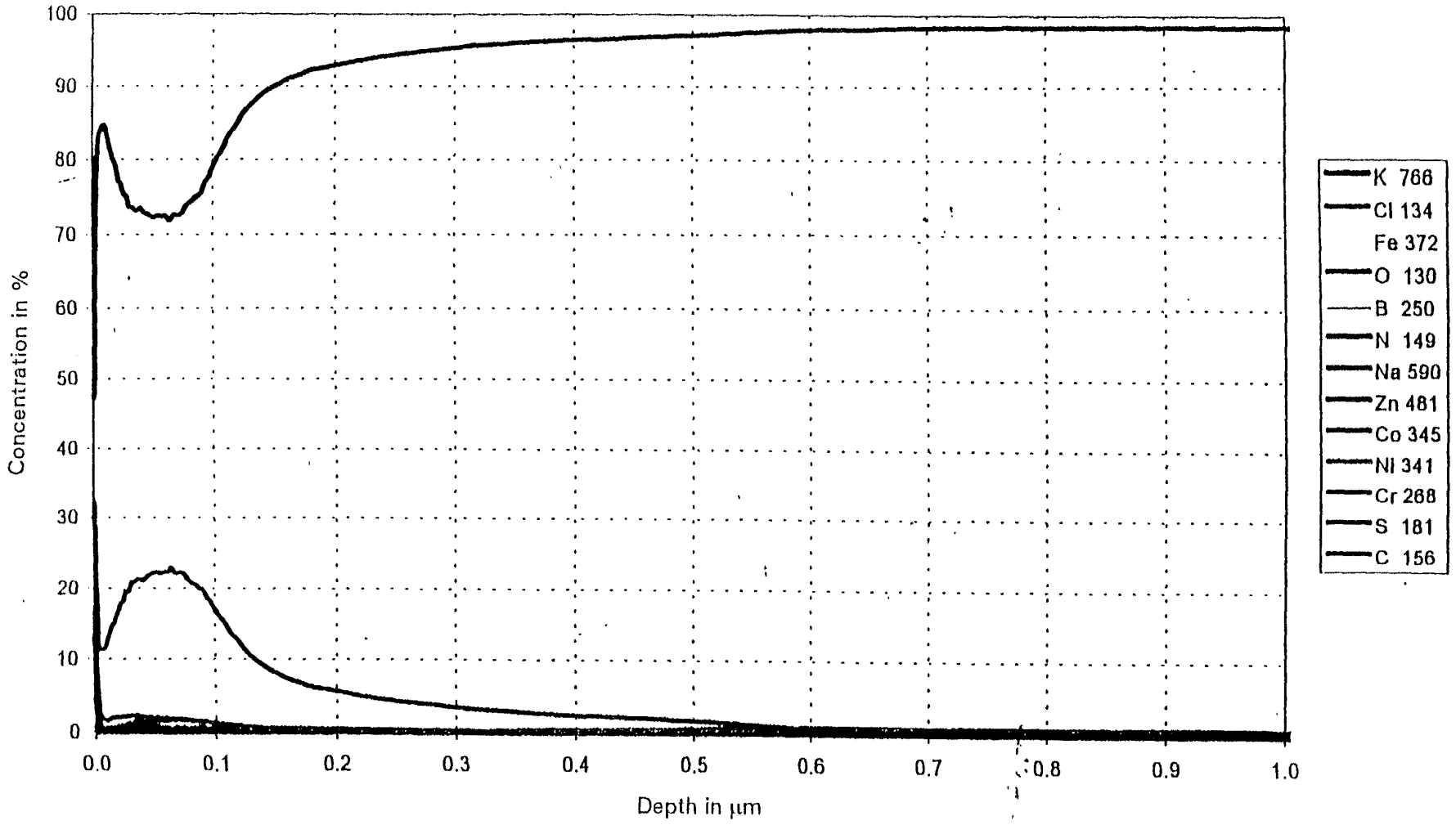


FIG. 20

Diagram 1

Sample 6, Measurement Position A

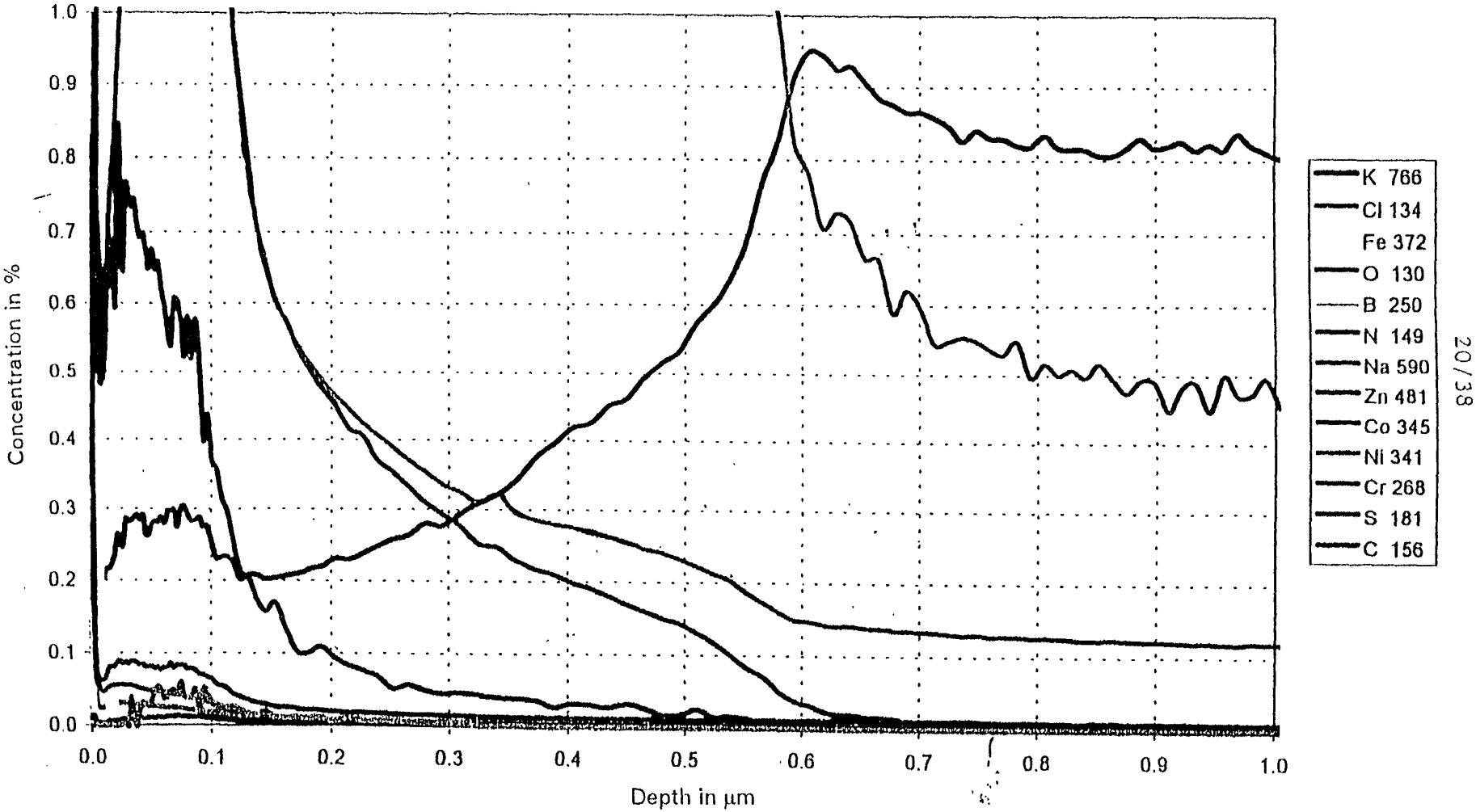


FIG. 21

Sample 6, Measurement Position B

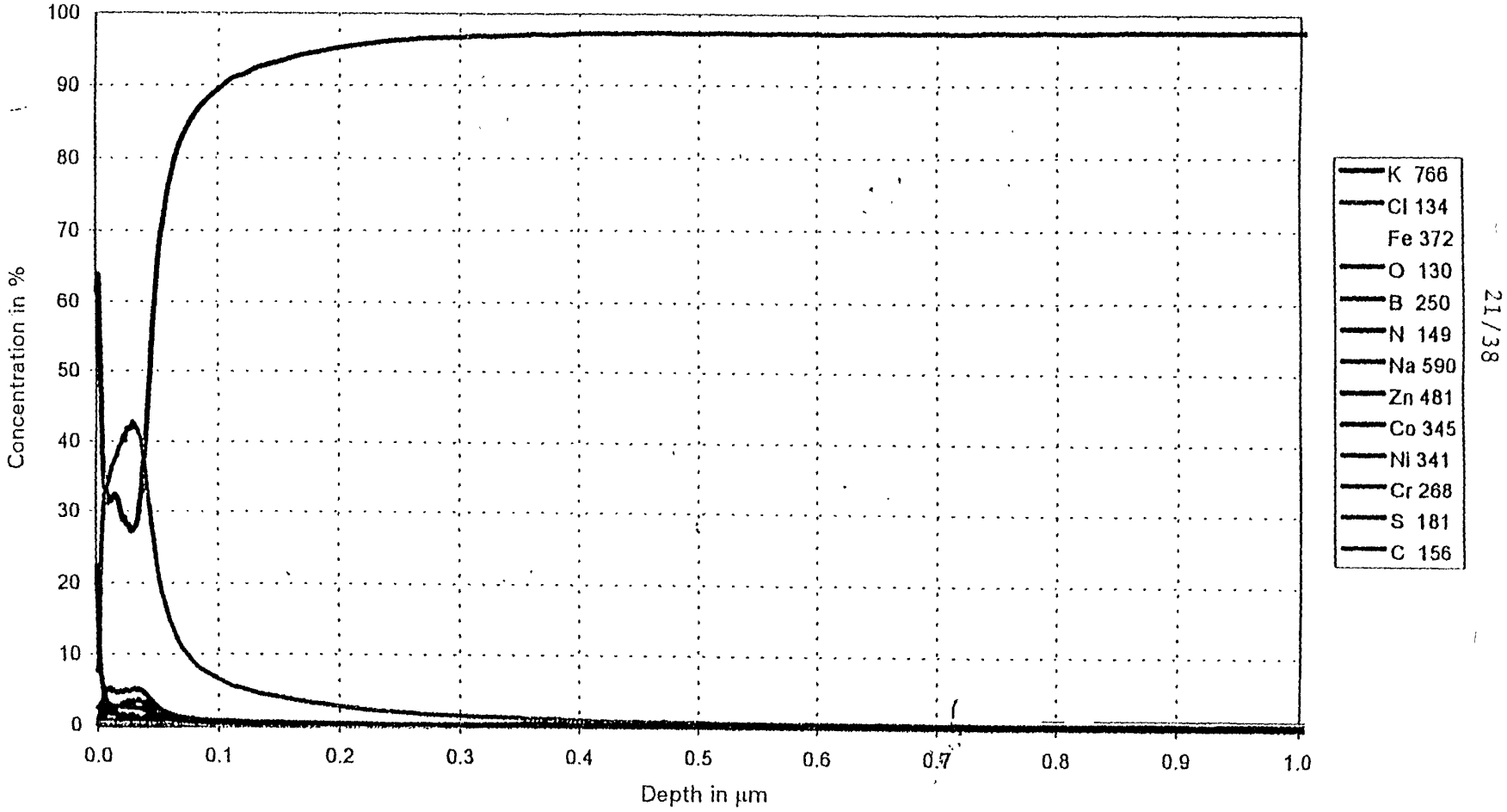


Diagram 2

FIG. 22

Sample 6, Measurement Position B

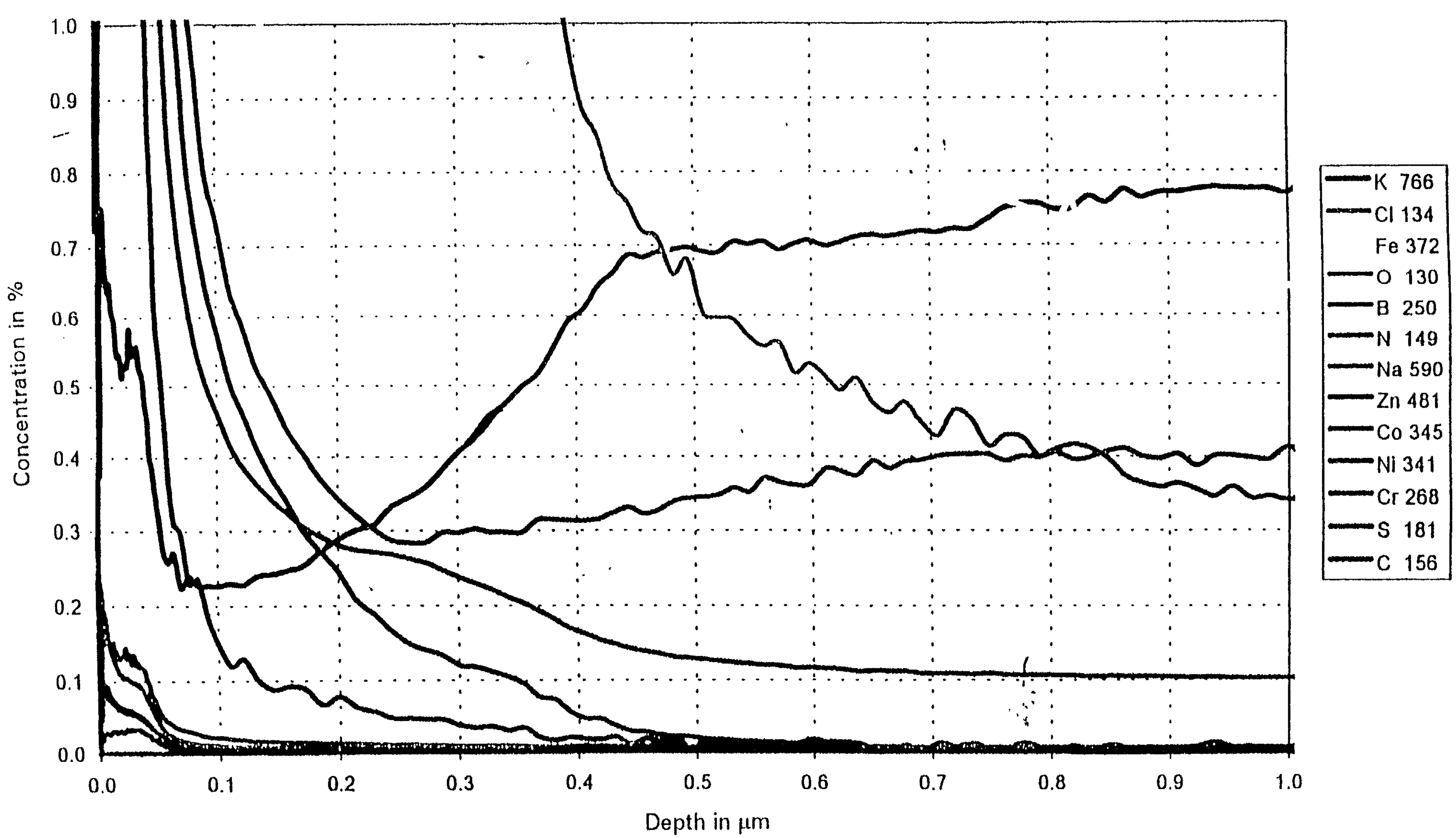


FIG. 23

TOF-SIMS Diagram 1681660

Sample 6, Measurement Position C

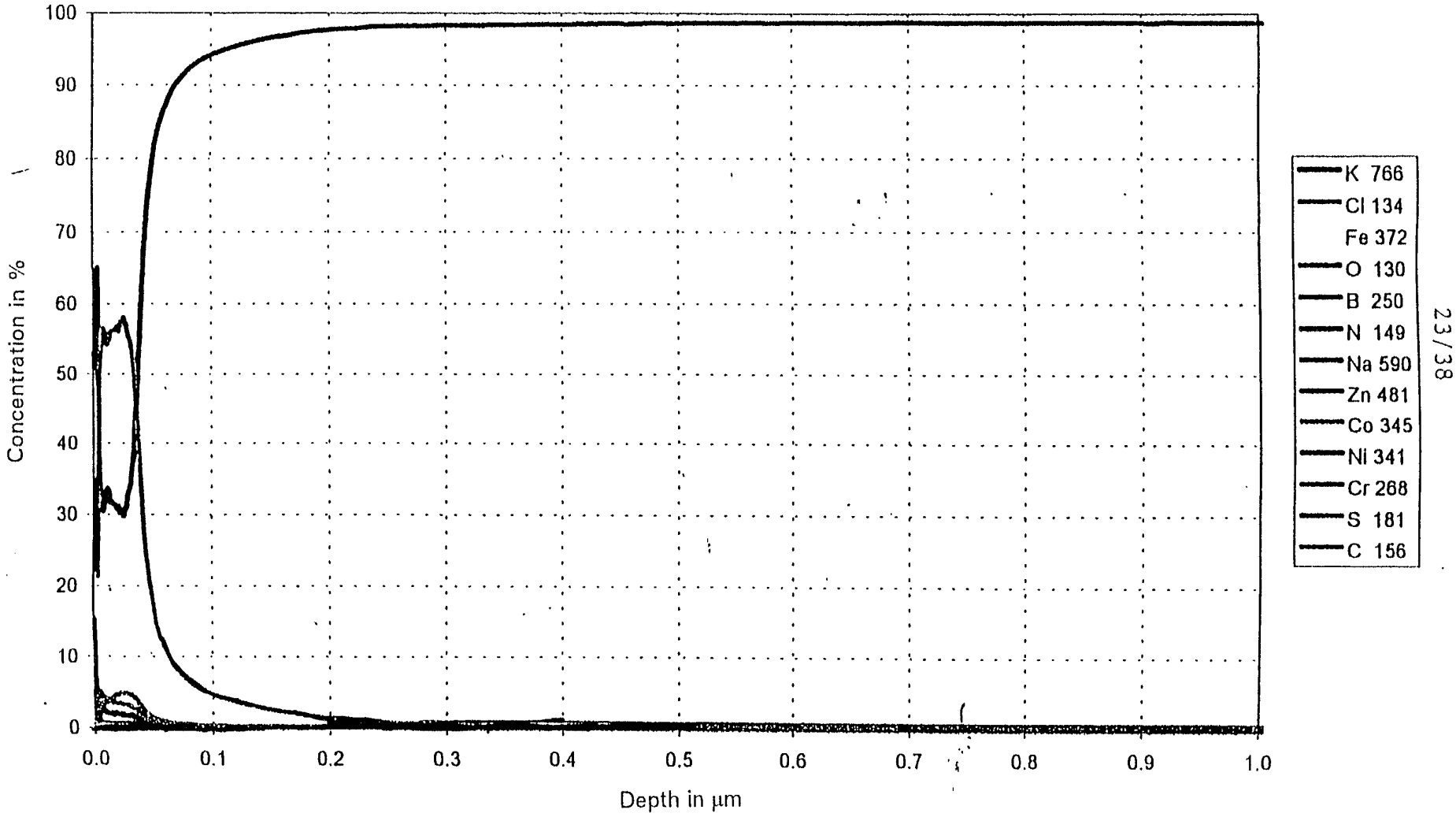


Diagram 2

FIG. 24

Sample 6, Measurement Position C

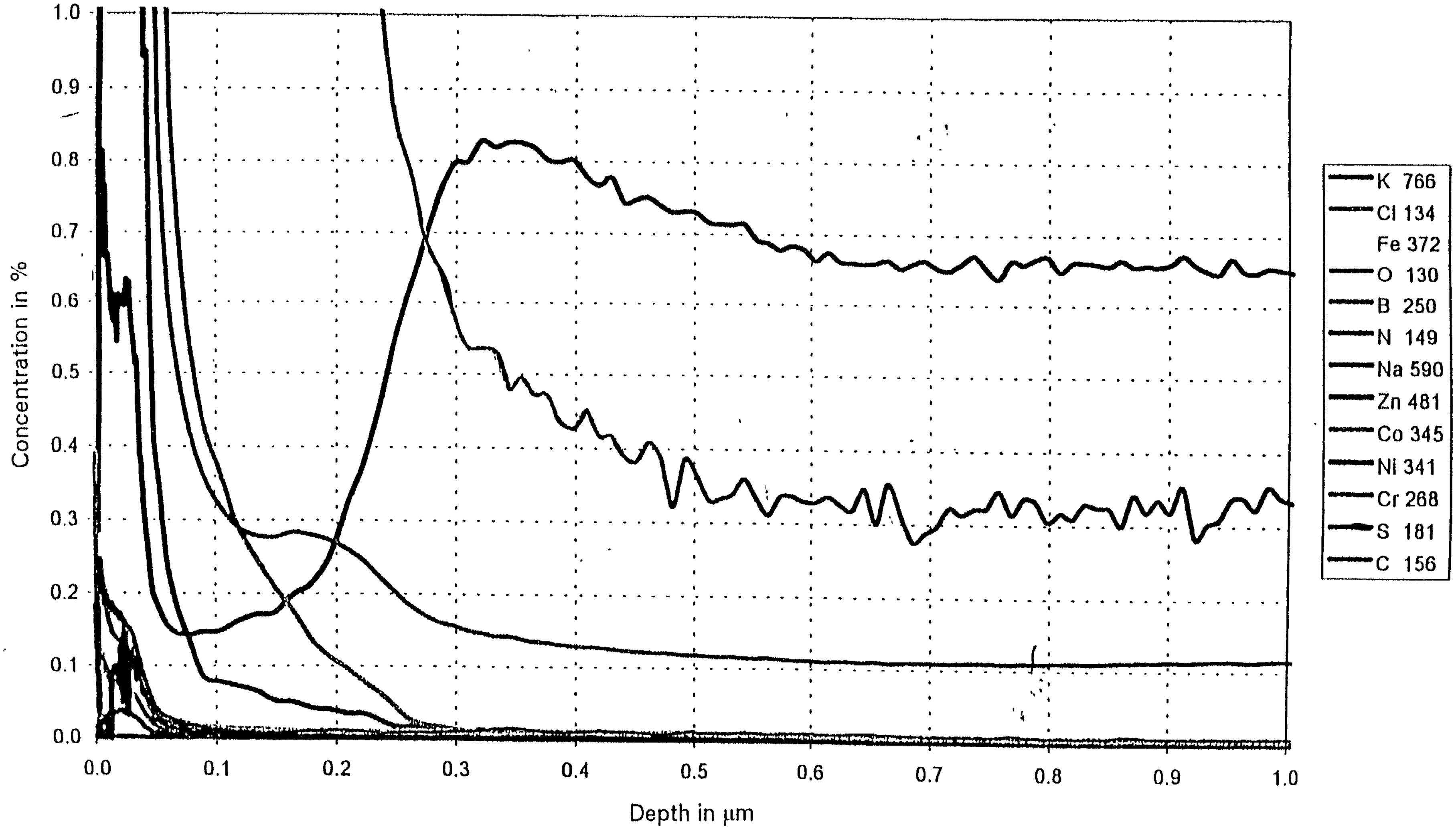


FIG. 25

Diagram 1

Sample 6, Measurement Position D

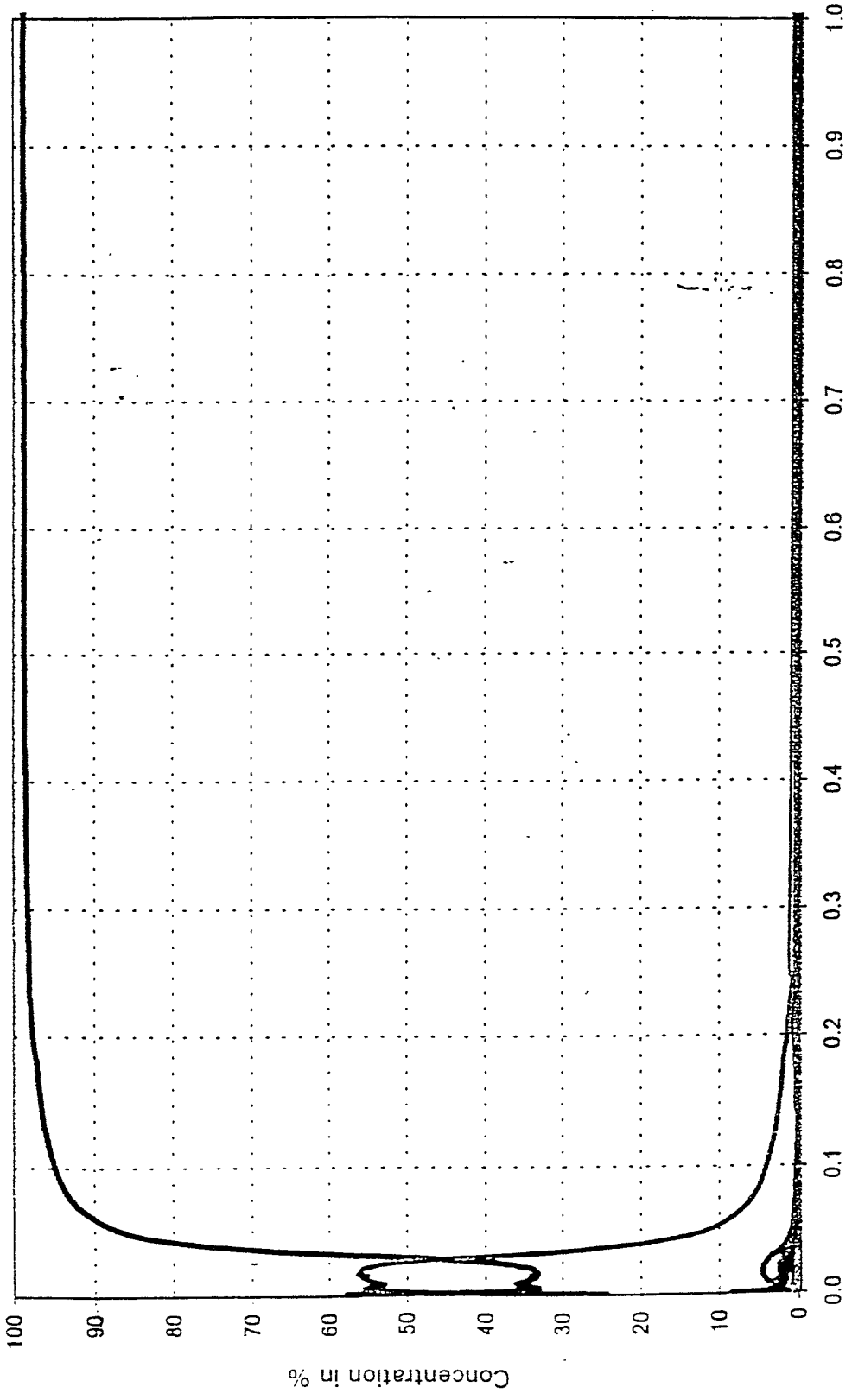


FIG. 26

Sample 6, Measurement Position D

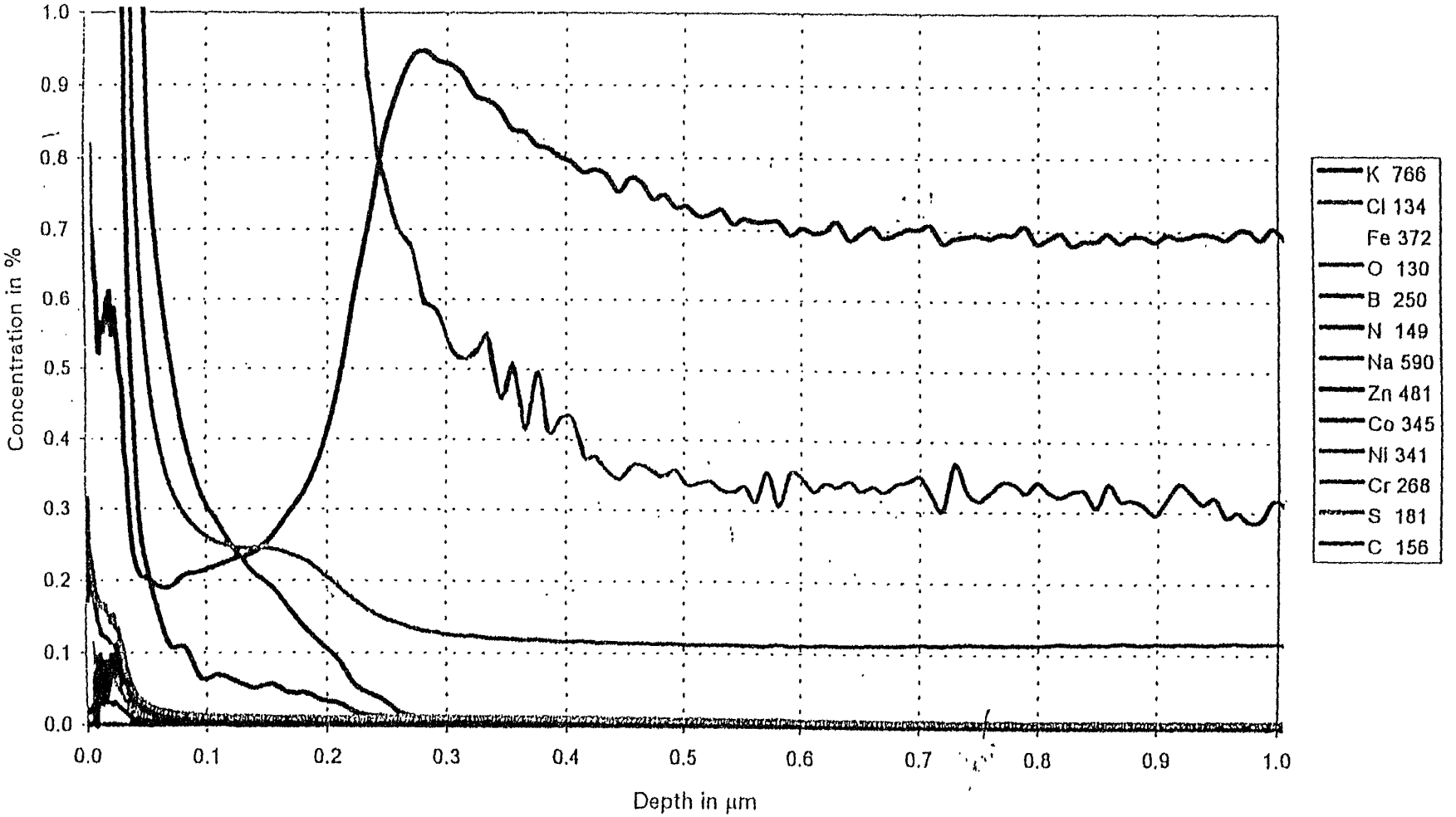


Diagram 1

FIG. 27

Sample 7, Measurement Position A

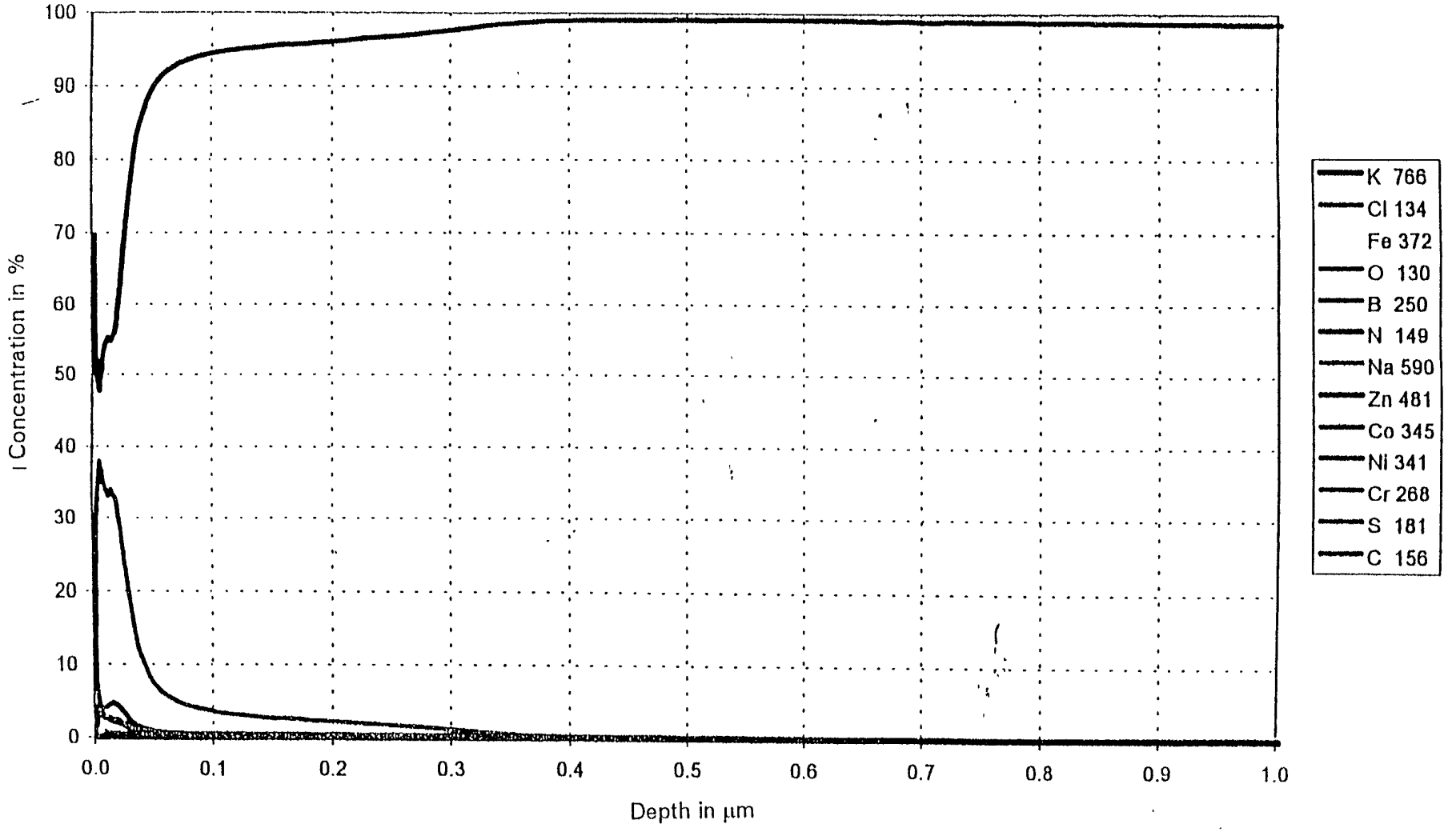


FIG. 28

Diagram 2

Sample 7, Measurement Position A

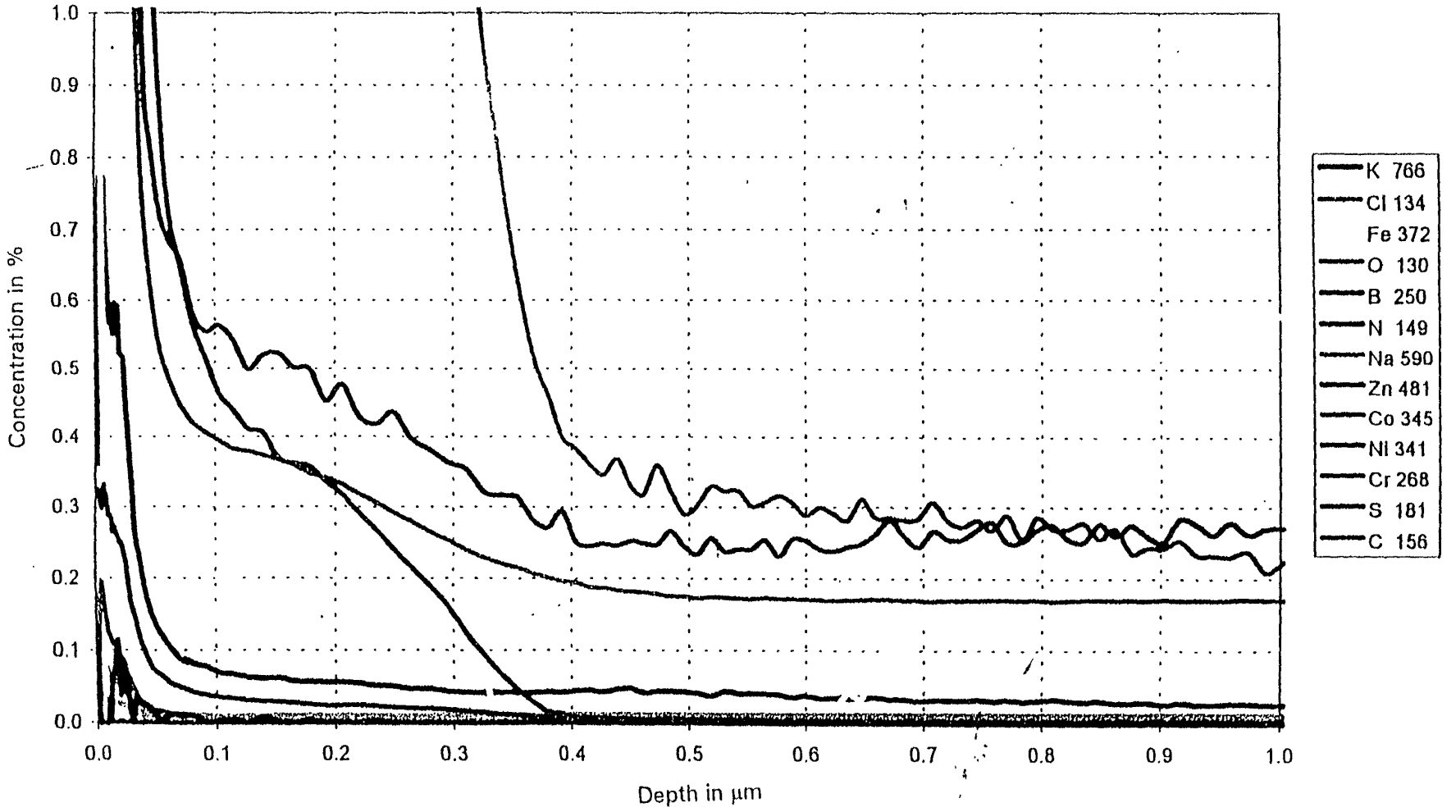


FIG. 29

Diagram 1

Sample 7, Measurement Position B

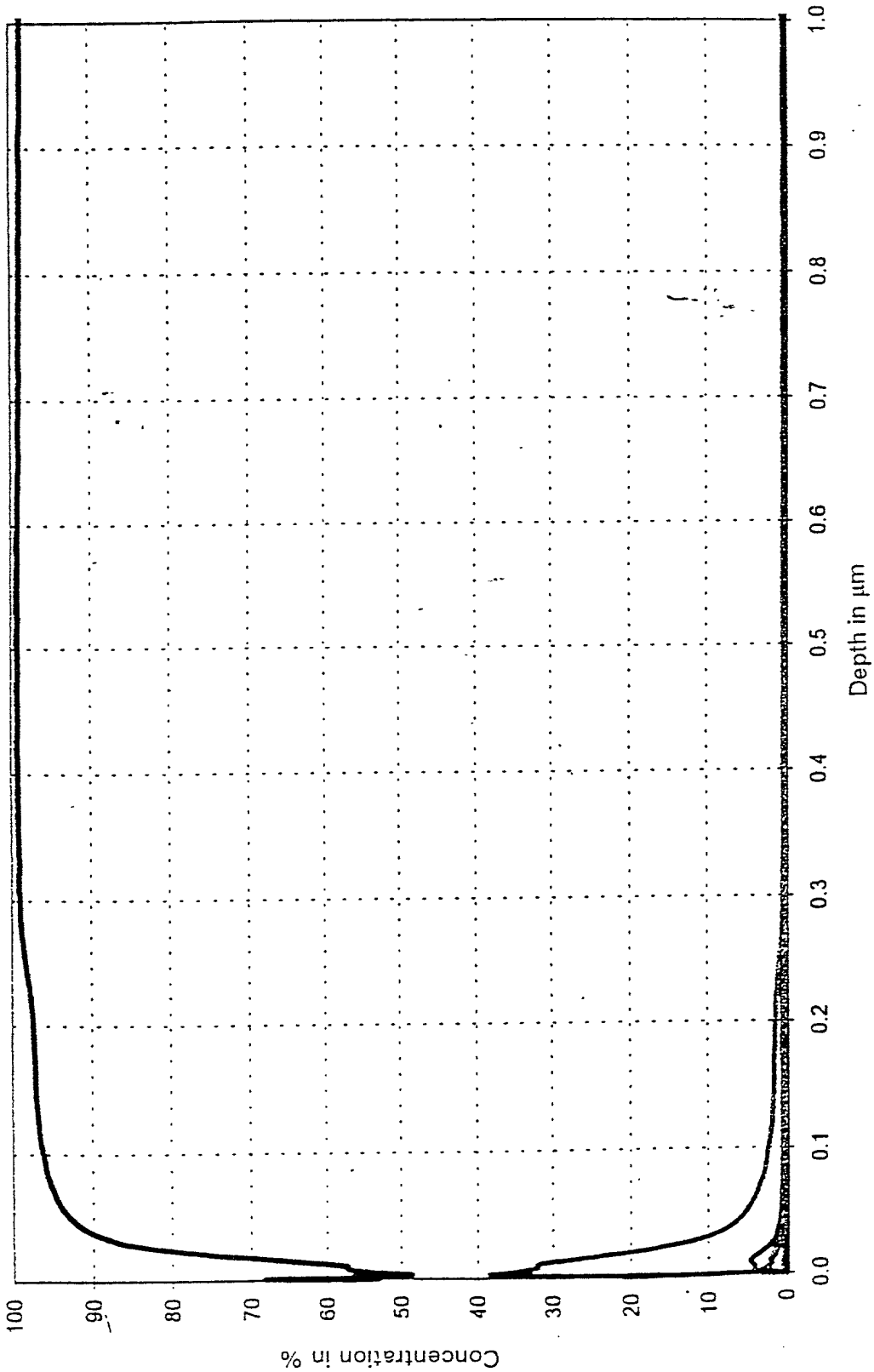


Diagram 2

FIG. 30

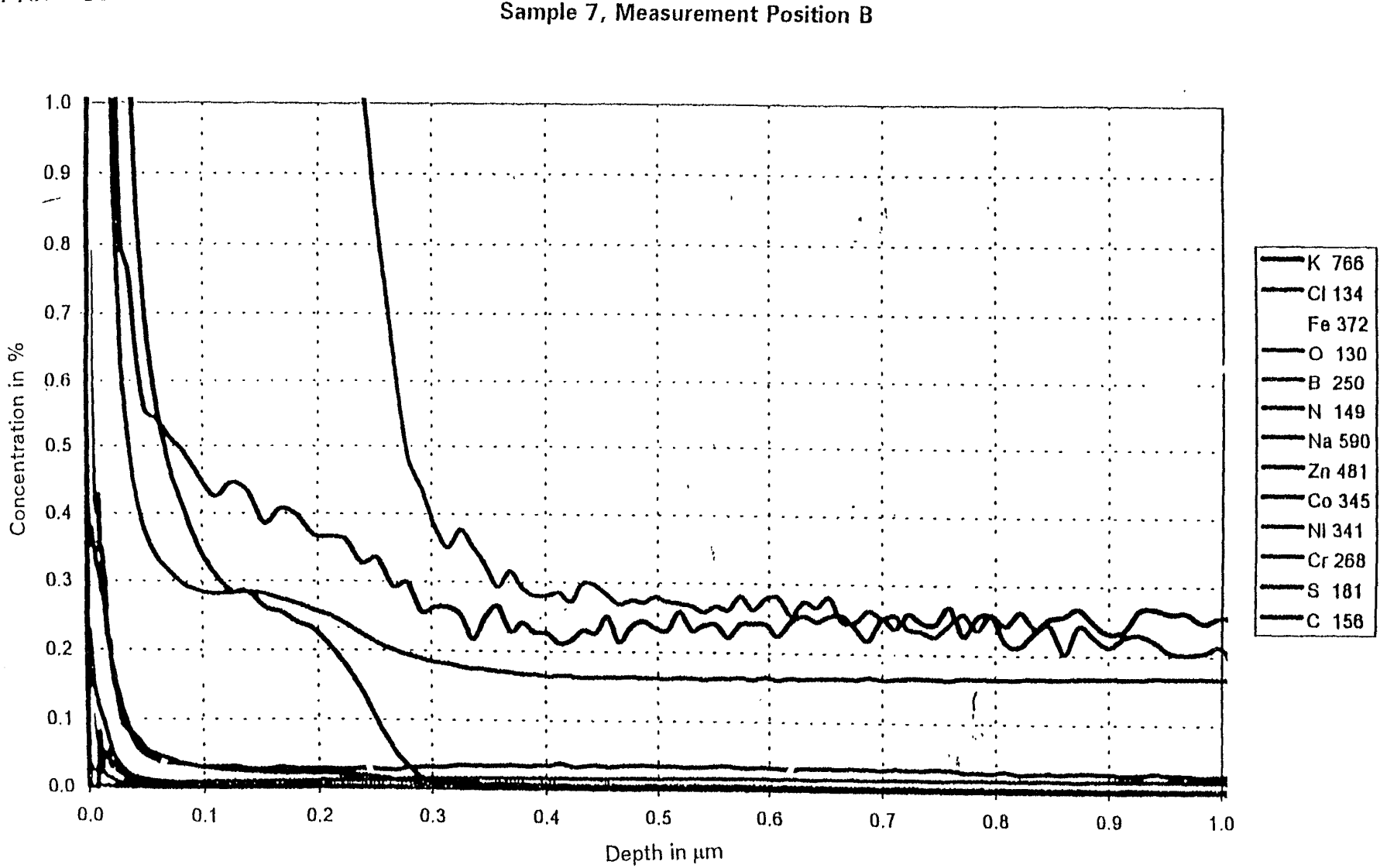


Diagram 1

FIG. 31

Sample 8, Measurement Position A

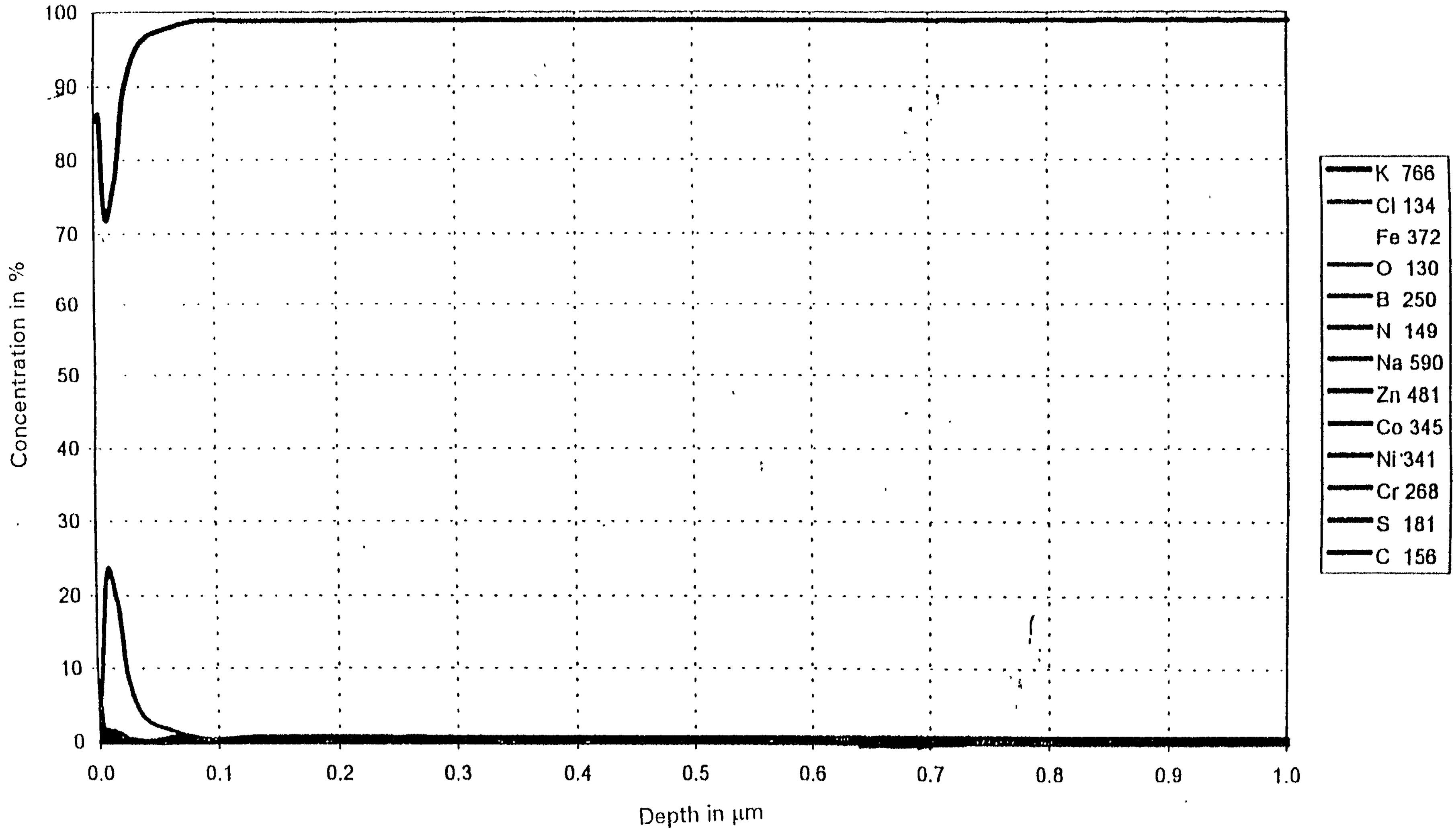


Diagram 2

FIG. 32

Sample 8, Measurement Position A

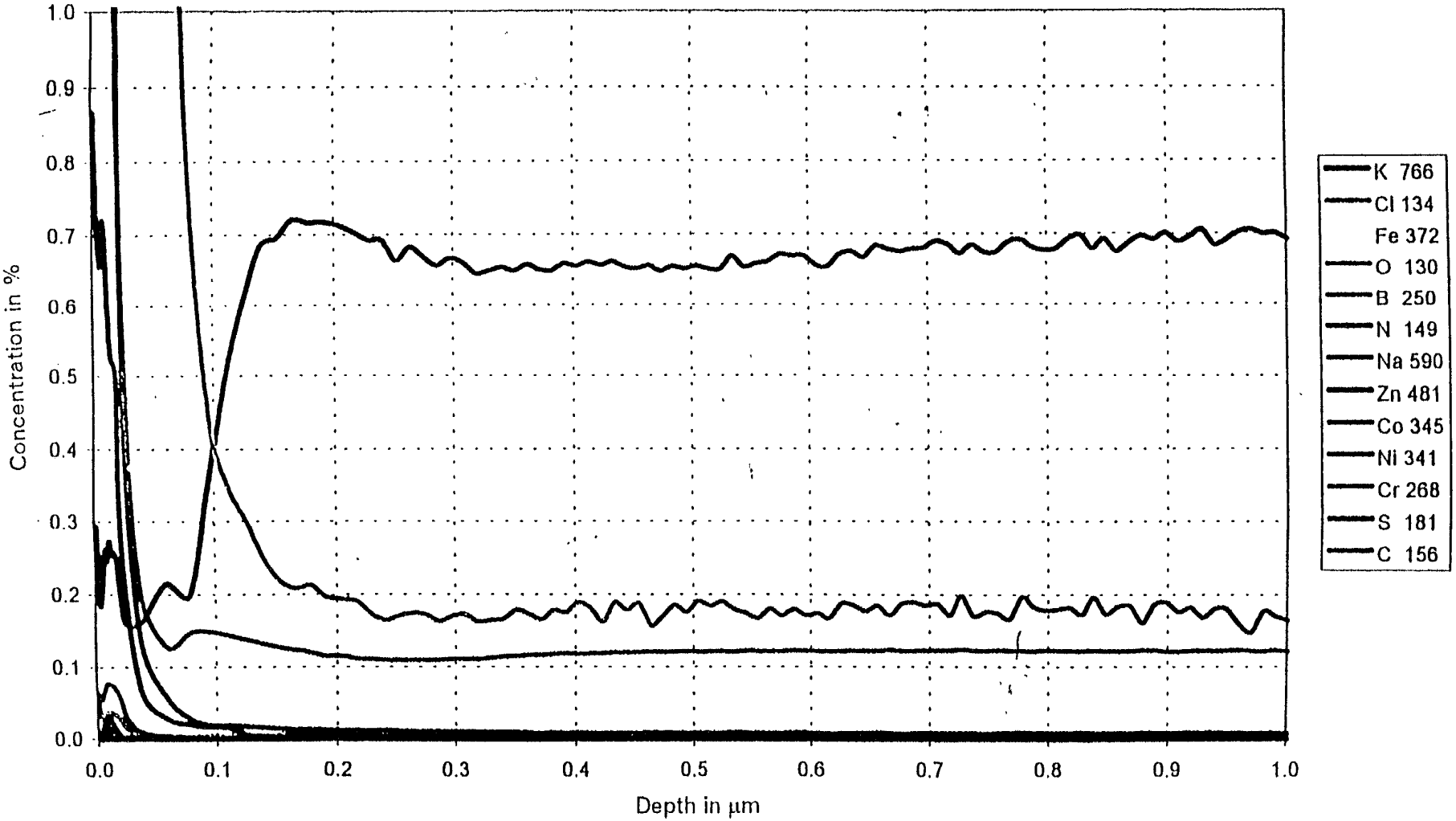


FIG. 33

Diagram 1

Sample 9, Measurement Position A

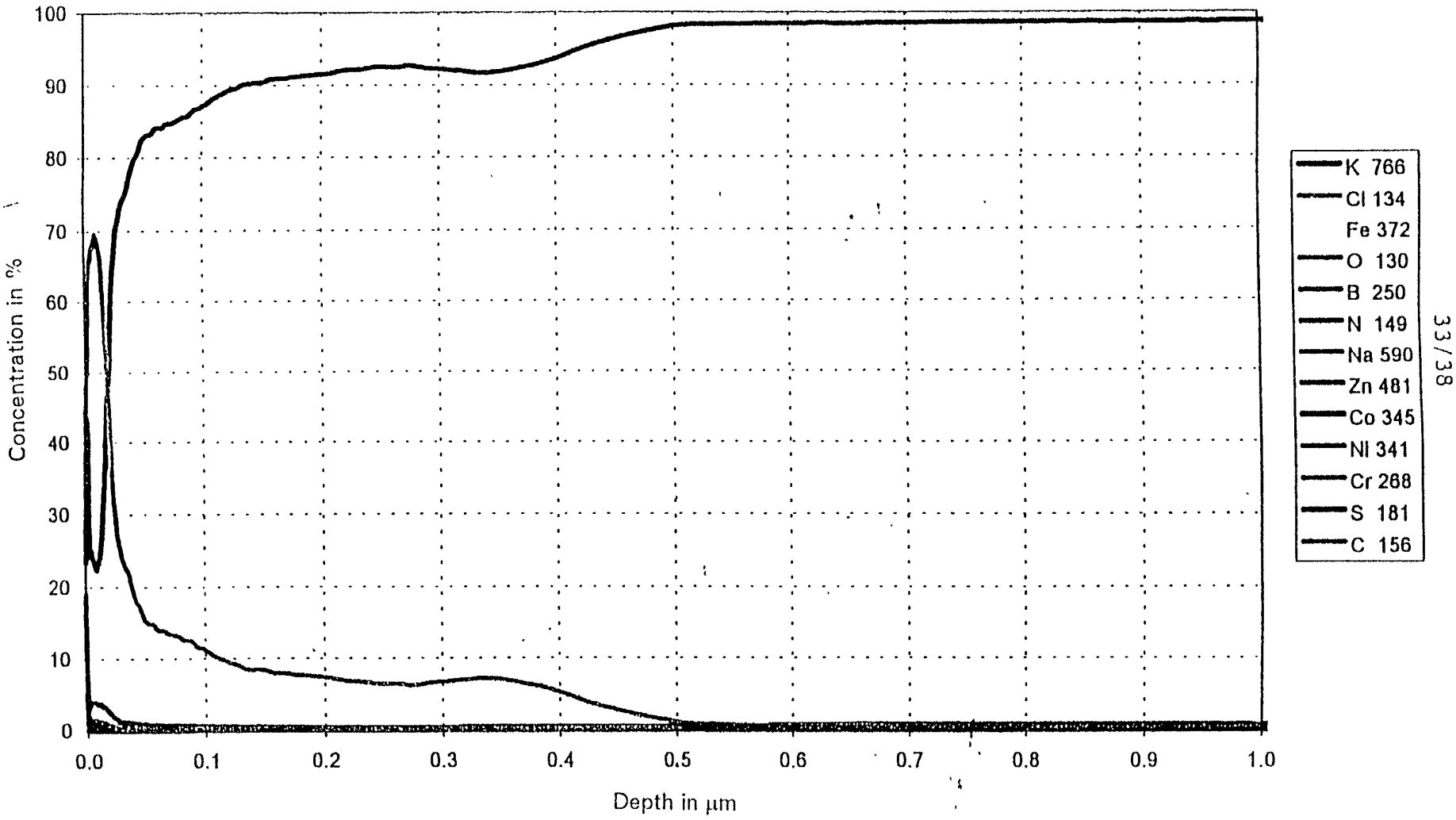


Diagram 2

FIG. 34

Sample 9, Measurement Position A

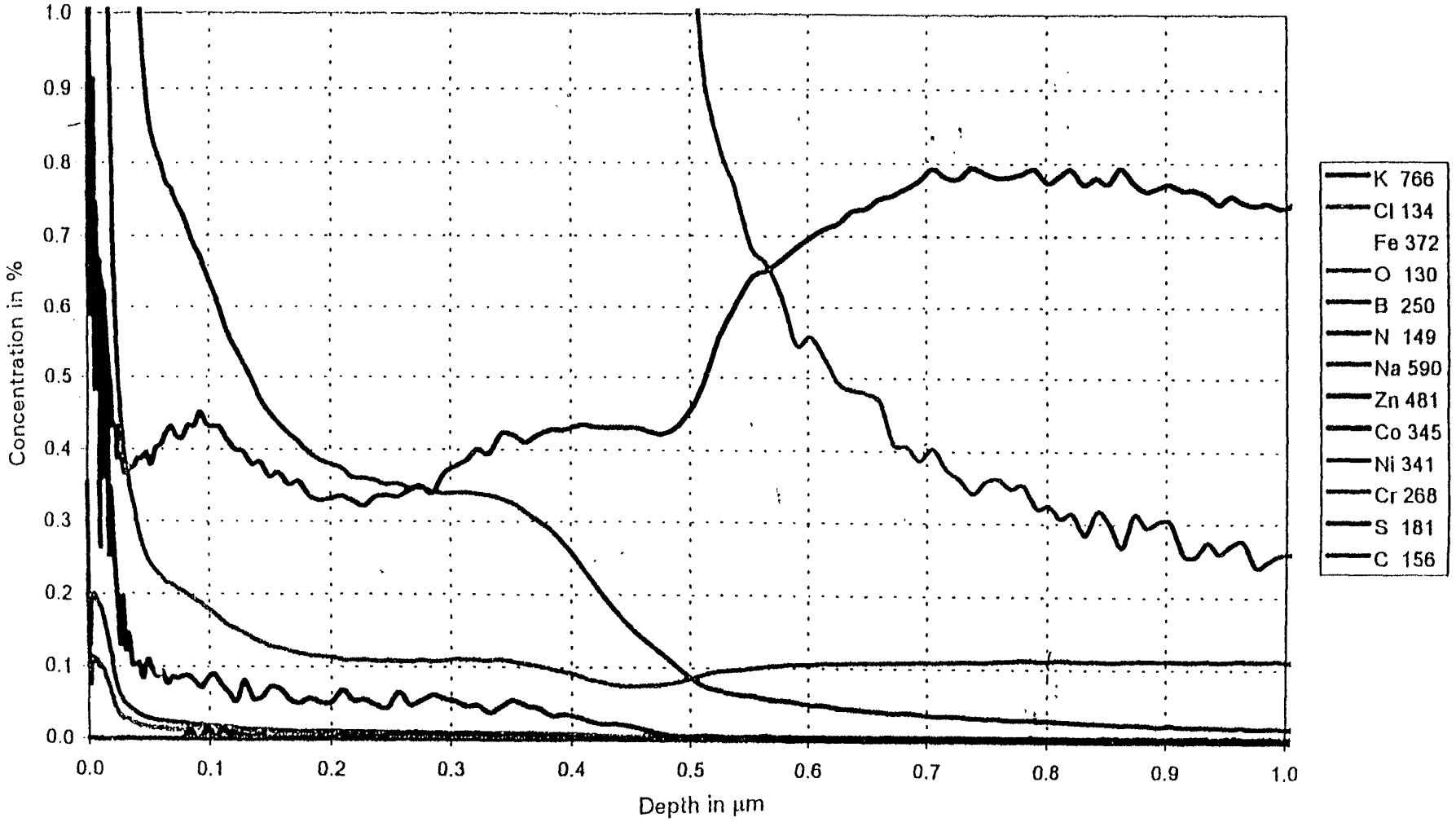


Diagram 1

FIG. 35

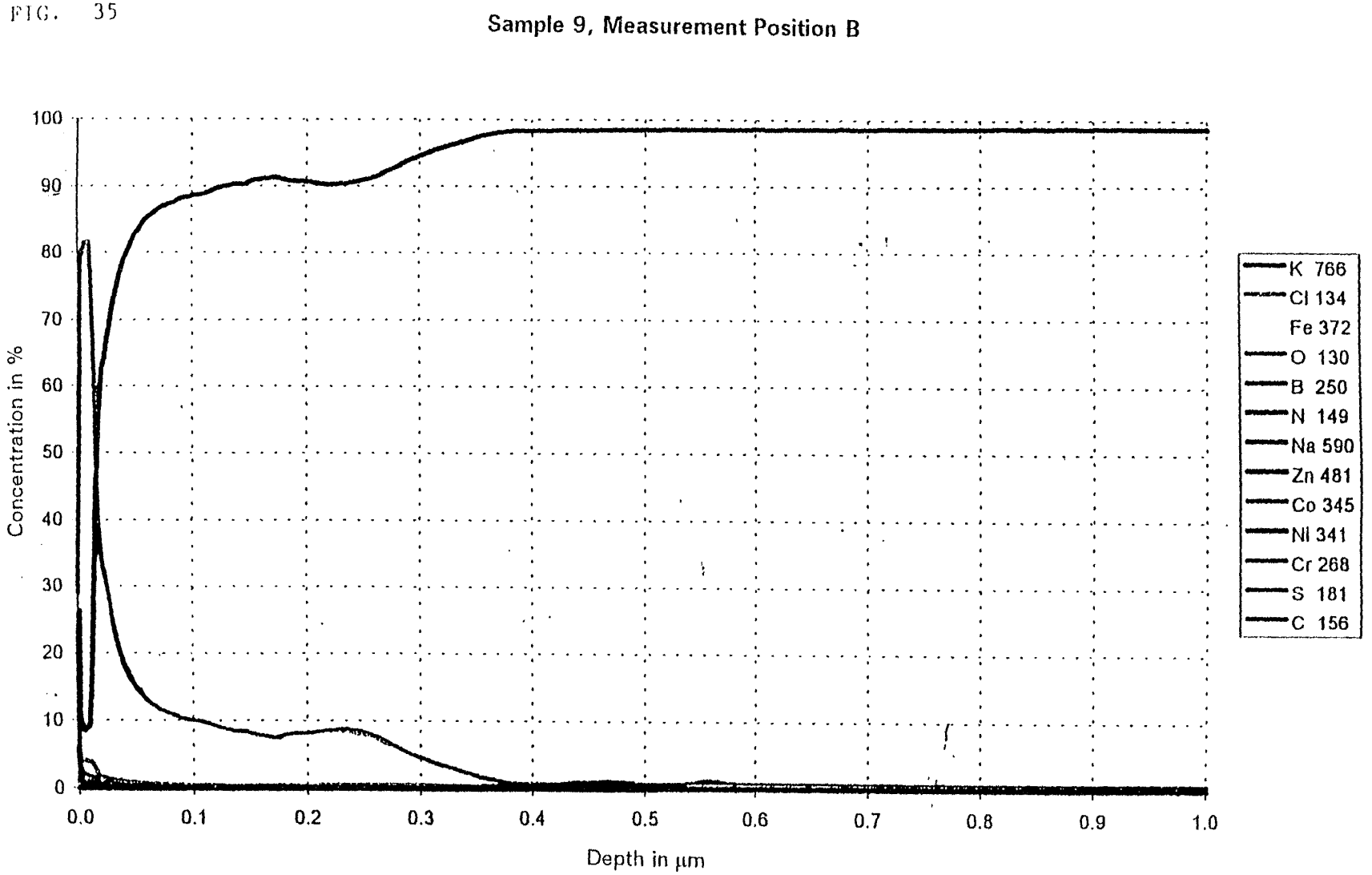


Diagram 2

FIG. 36

Sample 9, Measurement Position B

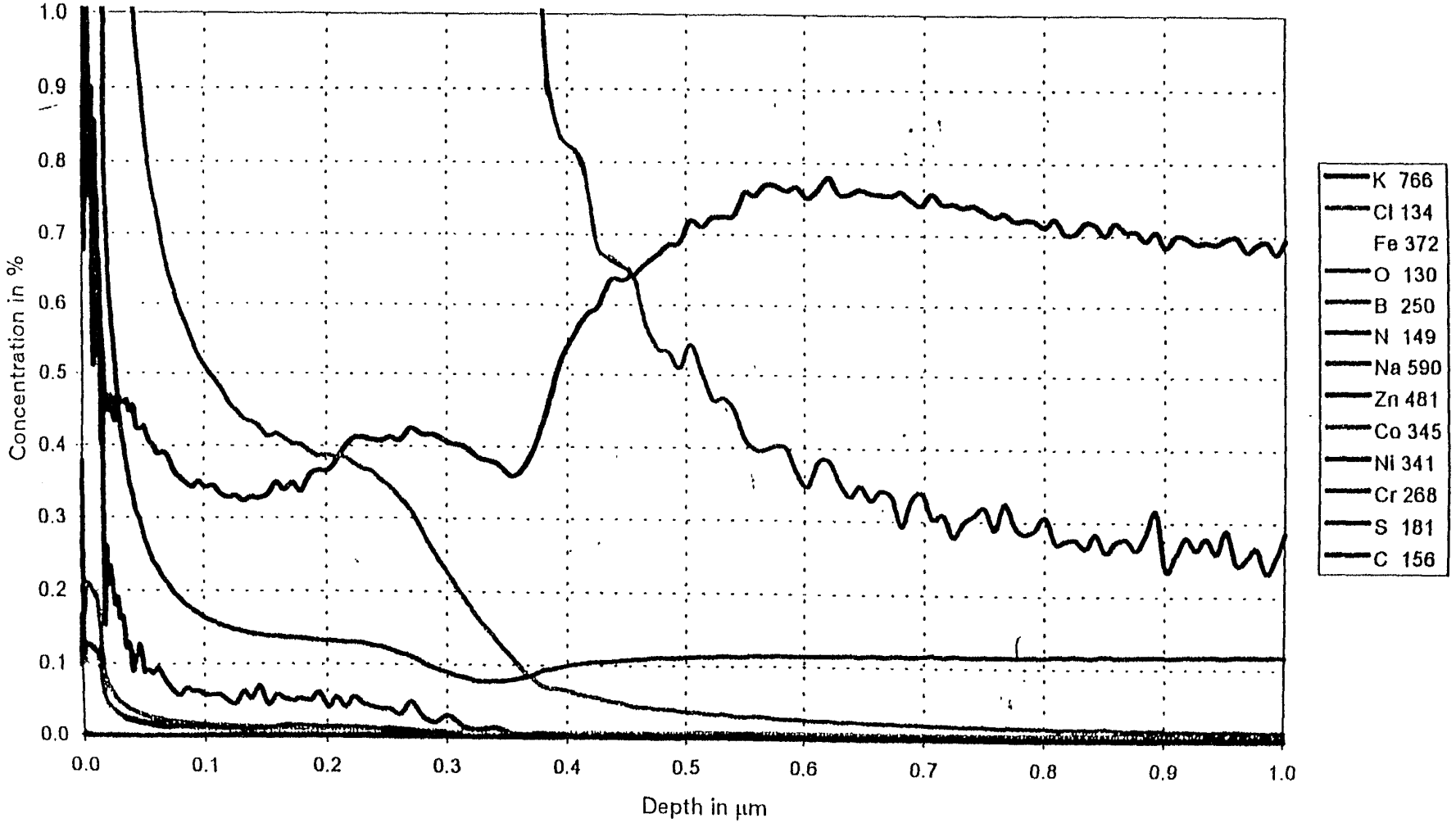
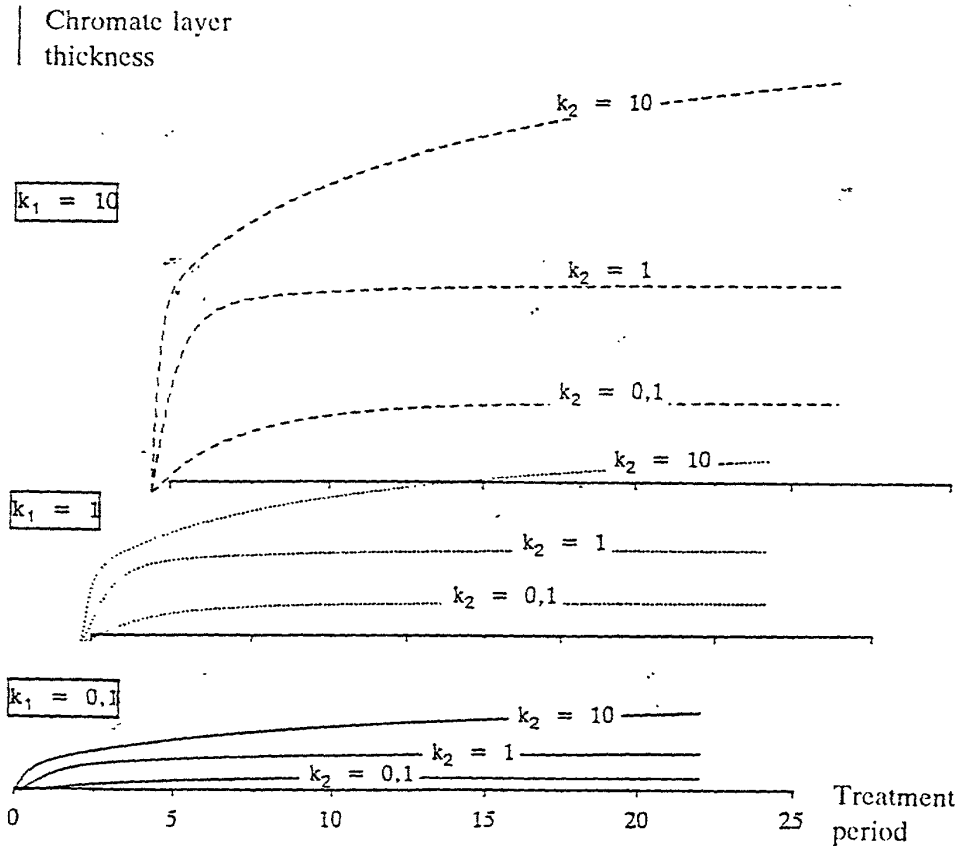


FIG. 37

	Methods							
	Ellipsometry nm	SEM nm	Glow-discharge spectrometer nm (Cr > 1%)	with Cr (%)	chromium index	nm (Cr > Zn)	nm (Cr > 30%)	Sample No.
1. Prior Art								
Yellow chromation Cr(III) + Cr(VI)	-	300	440	11	48	17	25	9
Blue chromation Cr(III)	98	60	60	8	5	0	0	8
2. Invention (Chromitation)								
60°C Cr(III)	432	300	344	7	23	2	15	1,2,3,4,5
100°C Cr(III)	595	-	358	10	38	22	28	6
60°C on Zn/Fe Cr(III)	-	-	282	6	16	0	16	7
100°C, two-fold concentration Cr(III)	953	-	-	-	-	-	-	

Fig. 38



Computer simulation of the kinetic model of chromate coating of zinc for various rate constants